The Welding Engineer

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olume XXIV **Annual Metal Show Issue** Number 9

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The full order was completed by Friday noon, loaded on a truck and dispatched to Brooklyn, arriving there just 55 minutes before sailing time. Maurath plant is at 7309 Union Avenue.

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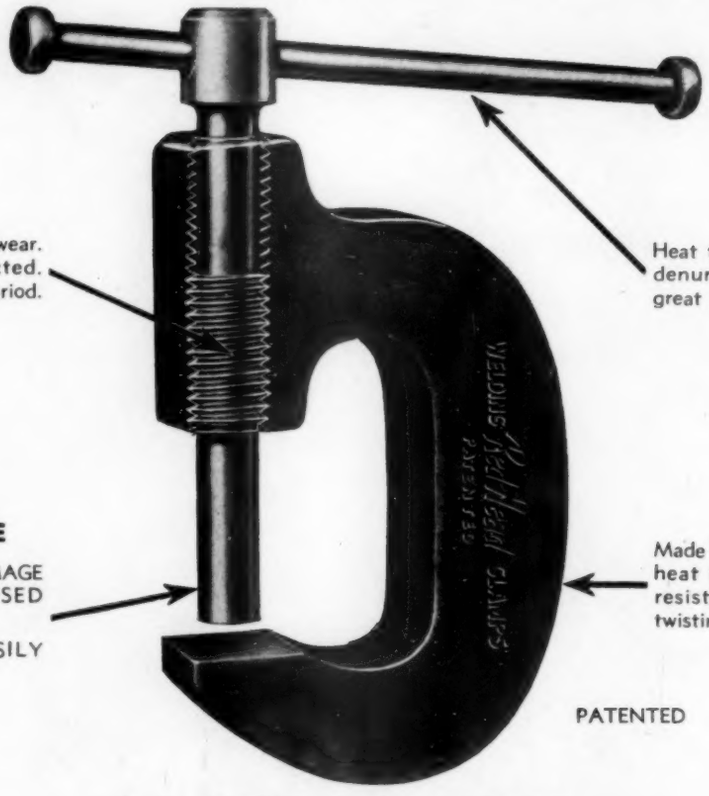
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VOL. 24 NO. 9

ANNUAL METAL SHOW ISSUE

SEPTEMBER, 1939

The Welding Engineer

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Trend of Welding Market

THE QUICKENING TEMPO of industrial production in the United States, particularly in the steel industry, because of the fear of war inflation and the possibility of war business, at least in raw materials out of which the implements of war are made, has directed a great deal of attention to the welding and cutting processes. It has been evident for some time to those who are well informed on market trends that welding and cutting is definitely on the increase.

The Welding Engineer has compiled a summary of government statistics for the three census years, 1933, 1935, 1937, which show very convincingly that the application of welding and cutting is increasing faster than the use of steel. This is well illustrated by the following statistics released by the Census of Manufactures:

1937	$82,600,000—	$1.64 per ton of steel
1935	52,860,000—	1.56 per ton of steel
1933	33,650,000—	1.47 per ton of steel

These figures are very conservative, because they do not include thermit welding; neither do they include the consumption of acetylene generated on the user's premises through the conversion of calcium carbide. Neither do these figures include the miscellaneous shop tools which are a practical necessity in welding operations. We believe that no one will deny the conservativeness of these index figures.

Another very striking indication of the upward trend in welding is the more rapid increase of welding electrode sales than of steel ingot production during recent years. It will be noted from the following figures, which are based on statistics released by the National Electrical Manufacturers Association and the American Iron and Steel Institute (steel ingot tonnage), that welding electrode sales have risen from 1.4 lbs. per ton of steel in 1932 to 3.5 lbs. per ton for 1938, and also for the first six months of 1939:

	Electrode Sales per Ton of Steel Ingots
1932	1.4 lbs.
1933	1.7 lbs.
1934	2.2 lbs.
1935	2.3 lbs.
1936	2.3 lbs.
1937	2.5 lbs.
1938	3.5 lbs.
1939*	3.5 lbs.

* First six months.

At the present rate of activity, it is conservatively estimated that the 1939 electrode sales total will exceed the previous high mark established in 1937 (128,360,000 lbs.). Business optimism in our field is certainly founded on something more tangible than wishful thinking. It is interesting to speculate as to just how far the market index per ton of steel will go before it reaches a fairly stable level. Some well known welding engineers contend that welding (and cutting) at the present time has only realized about 20 to 25 per cent of its ultimate potential. In other words, the use of welding will continue to grow faster than the use of steel until the potential uses of welding and cutting are more fully realized. We will be traveling along the sharply rising portion of our industry's growth curve, for the years immediately ahead at least, before our industry reaches what is commonly called the "saturation point."

Convention Economics

RECENT CONVERSATIONS with a few of the leaders in the welding field raises a basic question as to the economic importance of technical conventions and trade exhibits, such as the forthcoming annual meetings during Convention Week in Chicago, October 22-27. The excitement generated by the outbreak of hostilities across the Atlantic prompted the idea in the minds of some men that a Metal Show and American Welding Society annual convention could not be justified in view of the anticipated pick-up in industrial activity this Fall. We fail to see any logic in this line of reasoning. After all, why does the American Welding Society, in common with thousands of other organizations, hold annual meetings, and particularly, why do manufacturers go to the expense of providing quite elaborate exhibits in connection with these annual conventions of technical societies?

The answer seems to us to be very clear. The technical men and shop production executives are convinced that these conventions and equipment exhibits are highly educational, and afford an opportunity to gain the type of information needed in the least possible time, and with the least effort. No one at all familiar with meetings of the American Welding Society would dare to imply that a trip to the annual meeting is a "pleasure junket." There is far too much serious work to be done. Personal contacts at these meetings never fail to be helpful in broadening the welding man's background of experience and technical knowledge. Visitors to the Metal Show, if they are keenly observing, can almost obtain the practical equivalent of a college education in a few day's time spent studying the educational exhibits. This exposition presents a grand opportunity to examine the latest equipment.

STATEMENT OF POLICY

The world is entering a crisis, the result of which no one can foresee. Other wars have brought inflation, followed by unemployment and depression after peace was achieved. America's experience in the World War illustrates this fact.

Much of this post-war trouble would have been eliminated by a more foresighted price policy on the part of manufacturers and distributors. Price inflation by the seller when he had a dominant position resulted inevitably in reaction with deflation, depression and suffering. Many of those price increases were not warranted.

Before such an inflationary cycle of prices is again started, we publicly pledge ourselves, as far as possible, to maintain present prices.

Further, if the materials we buy are increased in price, or the cost of labor is increased, then we pledge ourselves to raise selling prices no more than the bare increase in cost of raw materials and labor going into our products.

Further, we pledge ourselves to pass on to our customers the reduction in cost made possible by better manufacturing methods, wider distribution and technical advances in production.

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Cleveland, Ohio

J. F. Lincoln

President

Welding the "feet" of an earth-packing unit to the drum. All welds can be made in flat position in this fixture. This is Fig. 20 in the author's series of illustrations. Photo (R. G. Le Tourneau, Inc.).

Engineering department control of the

Arc Welding Process

★ Part 2—A.W.S. symbols form basis for standard procedure and cost control—Analysis of factors influencing welding costs—Good fit-up is important

By WALTER J. BROOKING*

Engineering Department, R. G. Le Tourneau, Inc., Peoria, Ill.

THREE SPECIAL WELDING situations proved to require enough additional attention or skill on the part of the operator to justify special study and classification. One type is a weld laid down upon circular joints. A circular weld can lie in any of the planes or positions covered by the position symbols, so the symbol letter for position is used and the letter "C" follows, indicating that it is a circular weld. Figure 16 illustrates this type of a weld. If the weld is positioned, the operator has to turn a fixture manually or adjust his arc to the movement of a mechanically-rotated fixture. If it is in the fillet, overhead, or vertical plane, additional skill is required to deposit the weld.

The second special weld is a weld deposited inside of some structure in such a manner that the welder has to have extra time allowed to complete the work properly within the limits of the standard set by the time-study department. They are designated as "inside" welds, and the letter "i" after the position symbol letter, as in Fig. 17, indicates that the weld is special.

The third special class of welds is the result of the "skip" method of making long welds to avoid distortion.

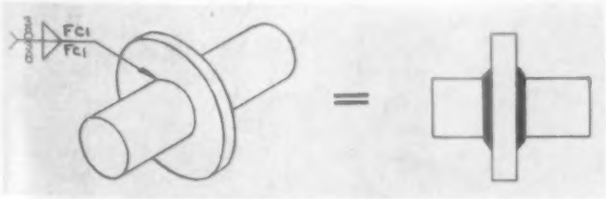

Fig. 16—Two ⅜ in. fillet type welds, deposited in flat position in a continuous circle around a shaft in one pass each.

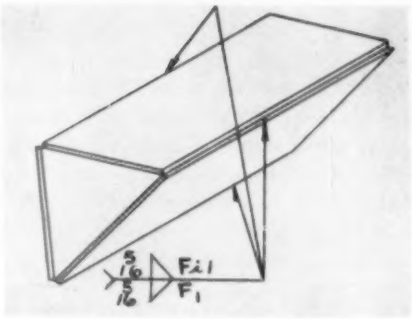

Fig. 17—three joints each welded with a 5/16 in. fillet type weld deposited in flat position outside in one pass and a 3/16 in. fillet type inside weld in one pass inside of object.

* First section of Mr. Brooking's article was published in the August, 1939 issue, pages 19-21.

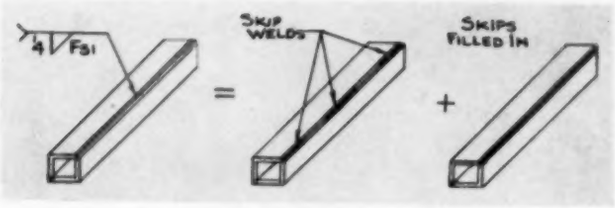

Fig. 18—A "skip" welded beam, welded with short ¼ in. flat "skip" welds with spaces between them, and then the spaces welded. This method is used to combat distortion.

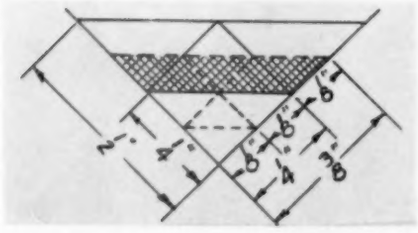

Fig. 19—Geometric arrangement showing comparative volumes of ¼ in., ⅜ in. and ½ in. welds.

A series of short welds is laid down with unwelded spaces between them. The spaces are then welded, leaving one long weld which was made in short skips. Such skip welds involve extra work and are designated by a small "s" following the position symbol as shown in Fig. 18.

Symbols, Standards, and Costs

The use of the foregoing symbols as a basis for standard procedure and cost control is based on a study of many welds in each of the classes and position of welds. The studies serve to establish an approximate time per unit of welding, and form a basis for evaluating labor costs.

The need for control of the size of welds to prevent underwelding and resulting failure is obvious. Similar control to prevent deposition of more weld metal than is needed is not so obvious, but is a means of keeping welding costs where they belong. Figure 19 illustrates how the volume of weld metal deposited in welds of successive sizes increases. The volume of a half-inch weld is theoretically four times that of a quarter-inch weld, and a three-eighths inch weld is over twice the volume of a quarter-inch weld. Actual studies of deposited metal in different sized welds yield values which closely parallel the theoretical values.

The effect of the size of welds and the positioning of welds may be illustrated by considering the costs of welding the structure shown in Fig. 20. The structure is one of four drums used in the earth-packing roller shown in Fig. 21. Let us consider only the process of welding all of the 120 separate "feet" on the drum, (the welds being made in Fig. 20). Table A shows the total arc time and the total pounds of electrode needed to weld the feet on the drum in different welding positions and also with different sizes of welds:

Table A—Welding Speed and Electrode Consumption

Size	Position of Weld When Deposited	Arc Time in Minutes	Approximate Pounds of Weld Metal
¼	Flat (one pass)	340	63 lbs.
¼	Fillet (one pass)	560	63 lbs.
¼	Vertical (two passes, from the top down)	856*	63 lbs.
⅜	Flat (one pass)	530	116 lbs.
⅜	Fillet (two passes, including cleaning)	1095*	116 lbs.
⅜	Vertical (one pass)	1550	116 lbs.

*Values include time needed to clean slag from first pass before depositing second pass.

The correct and cheapest way to weld the feet to the above structure is with ¼-in. welds in the "flat" position. The requirements of the job call for no more than a ¼-in. weld in this particular case. If ⅜-in. welds are used, nearly twice the electrodes are used (50% of which is waste) and the labor for actual deposition in the flat position is increased over 50%. If the welds are deposited in the fillet position, the cost is even relatively greater, because while the volumes of metal remain almost the same, the ⅜-in. weld made in the fillet position requires two passes and a cleaning of the first pass, to insure a sound weld. The inclusion of the vertical weld in the above table is only for comparative purposes. It is very unlikely that welds on such a structure would be made in the vertical position, but the figures are just as applicable to this case for comparative

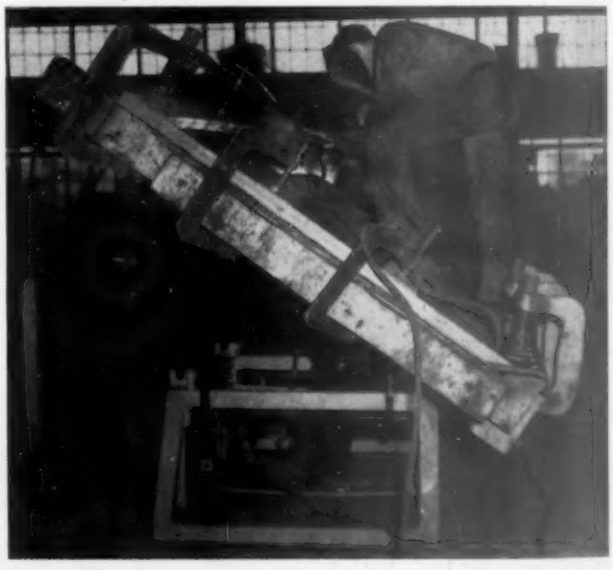

Fig. 22—A structure being welded in a four-way positioning air-powered fixture. All welds can be positioned for flat welding.

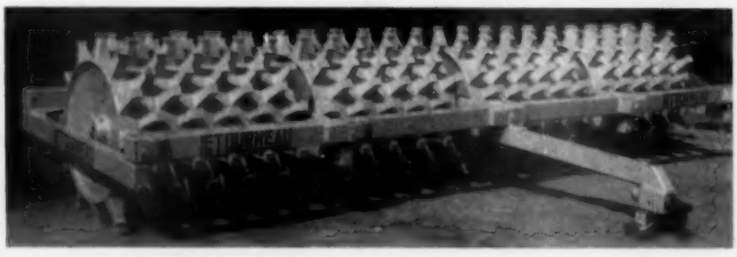

Fig. 21—An all-welded earth-packing roller, made up of four drums, such as the one shown in Fig. 20, assembled into a welded frame.

poses as if it were actually welded that way.

Because the positioning of welds so that they can be deposited flat decreases the cost so materially and actually makes a superior weld from the standpoint of fusion and appearance, it is often profitable to make fixtures which allow the structure to be rotated or positioned. Figures 22 and 23 show an air-powered "four-way" positioning fixture, made especially for the welding of the structure shown in the early stages of being built in Fig. 22 and complete in Fig. 23. A study of the amount of welding on the structure showed that over 30% of the welding time per structure could be saved by a positioning fixture. The fixture paid for itself rapidly in savings as shown by studies made after it was put into service.

Figure 24 shows a spinning fixture used for holding the parts of a structure in the correct relation to one another, as well as allowing for positioning many of the welds on the rather irregular shaped structure which is built in it. Large structures which are very irregular in shape can frequently be made up as small sub-structures, each built in a fixture which allows the positioning of the maximum amount of welding. Figure 25 is an example, showing an all-welded 72-in. boring mill. The main base, the two upright side members, the upper gear case and motor base and the table were each built as separate sub-structures. The large welds on the upright for example, are 1⅛-in. welds, deposited in the flat position, thus achieving the cheapest deposition cost, the best appearance, and the best fused joint possible for the structure. If as few as five were to be built, a positioning fixture for each main sub-structure would be easily and profitably made.

Fig. 25—An all-welded 72 in. boring mill.

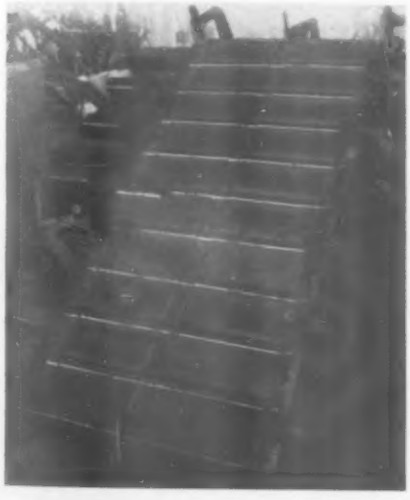

Fig. 23—The structure shown in Fig. 22 completely welded. (Fixture is tilted the other way from what it was in Fig. 22.)

Fig. 24—An irregular-shaped structure being welded in a spinning fixture which locates the parts for welding and allows the welds to be positioned for more economical welding.

The control of the number of beads or passes which make up a weld by means of symbols on blueprints is important, because it stands as a written order which can be checked by the inspection department. If an operator has not had the years of experience required to develop the judgment which would indicate to him that a weld must be made in four passes, he might make it in two and cause a failure of the product in service; or he might make it in six, at a higher cost than is really required to do the work satisfactorily. The exercise of control insures uniformity of processing, of appearance, of quality and of cost; and in addition it relieves the operator in the shop of the responsibility of solving such problems as amount of weld metal to deposit, method of deposit, etc., which really should be engineering and design problems.

The welding symbols outlined above have proved to be a usable and very satisfactory control. The system was worked out and a series of five lessons with questionnaires were given to all operators, inspectors, foremen, time-study men, and members of the engi-

Fig. 26—The straight lines and square form of this structure combine a minimum of cutting, fitting and welding with maximum strength and rigidity.

Let us consider the problems of each separately, together with the general methods of solution for some of the problems.

Engineering Skill—The engineer who designs a structure for welding naturally has in mind the job which the machine will have to do. The more simple the form of the parts that make up the machine, and the fewer points that have to be held in exact relation to one another, the easier it will be to make the parts fit. Figure 26 is the side structure for the main body of a large earth-moving unit. The square design, allowing the use of square-cut plates

neering department. In practice it is effective, and the standardization resulting from its application has increased the efficiency of our production of welded products to a very marked degree.

Welding Control and Fit-Up

The difference between profit and loss in the arc-welded method of fabrication can often be found in the way in which the separate parts of a structure fit together for welding. One outstanding feature which characterizes arc welded manufacture is the great freedom with which irregular steel shapes and plates can be fitted together and unified into one rigid structure. An accompanying feature to the first is that the fit-ups of the joints must be more exact than those of almost any other method of fabrication, because the parts seldom lap (as in the case of rivited joints or rolled seams) but usually fit edge-to-edge.

If occasionally the parts do not fit properly it does not necessarily mean that the parts must be scraped, as might be the case in cast or riveted designs; but it does mean that extra cost will be involved in the fitting together and using of the parts. Fit-up therefore in all welding jobs, and especially in the mass manufacture of welded products, is an extremely important consideration. There are three primary factors which determine the quality of fit-ups in welding:

1. The engineering, (design and drafting) of the machine and parts.
2. The workmanship and equipment of the shop.
3. The peculiarities of the welding process such as distortion from heat.

Fig. 27 (above) — The curved design of this scraper requires precision of cutting and fitting, but demonstrates the great freedom of design possible with arc welding.

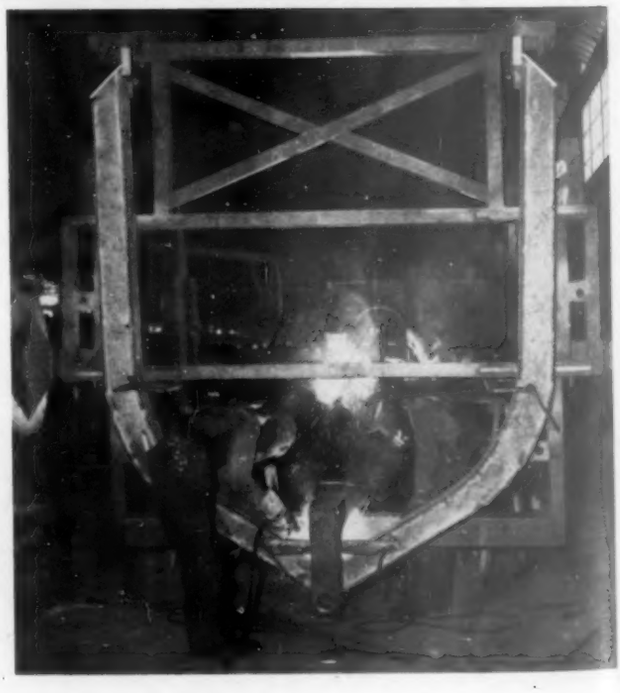

Fig. 28 (right) — Long curved members of this structure, shown in a spinning fixture used for setting the parts together accurately and positioning during welding, illustrate freedom of design for welding. This type of design requires care in cutting and set-up to avoid bad fits.

Fig. 29—Accurate drafting and careful cutting must be done to avoid bad fits on joints like this diamond plate to the end of the box beam.

and standard steel channels is simple and easy to draft, so as to avoid bad fits. If the detail draftsman measures accurately and the shop makes the cuts square, the parts should fit. Then if the designer has left the design elastic, so that the two front points in the sheet are held exactly, and the natural variation in cutting can accumulate at the rear of the structure, without having to be held to an exact measure, 1/16 in. for example, the rigidity of the fabrication requirements and the costs are less because of less measuring, etc.

Figure 27 is a unit whose design is in marked contrast to that shown in Fig. 26. The curves in the body and hinged front gate show the remarkable freedom of design in welding. The drafting layout for such curves is more complex and slight errors in detail may cause remarkable gaps or overlaps, when the parts of the first experimental machine are brought together.

Figure 28 shows another curved design, wish-bone in shape, clamped in a spinning fixture for welding. The curves in design may complicate the fit-ups and processing, but for many machines are so much more effective in use and efficient from the standpoint of use of material that the other types of design simply can't compare.

Figure 29 shows how simple structural shapes may be cut and fit up to plates effectively. The cutting is done with a hand torch, after the beam is marked off with a templet. The long bevel cut which fits the diamond plate to the end of the beam is the type of cut on which a slip in the drawing or in cutting may cause a very bad fit.

The solution of most of the fit-up problems of design and drafting entails first, careful drafting; and second, intelligent use of the first experimental machine built. The parts are to be drawn up as accurately as possible and then each one which fails to fit, when set up and welded, should be corrected and templets made from the corrected part. Careful checking and correction on parts of the first machine built can prove the design sufficiently correct to order parts for 10, 50, or 100 machines, with the assurance that they will fit if cut and processed correctly by the shop.

As the machine emerges from the experimental stage, after the first one is built, fixtures may be made for setting the parts together quickly and accurately, and for efficient positioning for welding. Welding symbols should then be put on the tracings specifying the size, position and number of beads for each weld. These symbols must be specified to weld a normal fit-up for that type of joint as they occur in the factory when the unit is being built.

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Mammoth Snow Cruiser Uses Arc Welded Construction

★ The Antarctic "Snow Cruiser," main cog in the government's South Polar claim-laying project is rapidly taking shape at the plant of Pullman-Standard Car Manufacturing Co., Chicago. The framework of the 4-wheel monster has been completed and also the application of the outer steel skin.

The "Snow Cruiser" was designed by the staff of the Research Foundation of Armour Institute of Technology, Chicago, as a fundamental research project under direction of Dr. Thomas C. Poulter, scientific director, who was second in command and senior scientist of the second Byrd Antarctic Expedition.

This "Snow Cruiser" will have a cruising range of 5,000 miles and a speed of from 10 to 30 m.p.h. depending upon the grade, surface conditions and weather. Looking like a transcontinental bus, only much longer, the "Snow Cruiser" will be 55 ft. in length, stand 15 ft. high on 10-ft. rubber tires and be able to span crevasses 15 ft. wide. Dr. Poulter's design makes it possible to raise or lower the cabin of the cruiser at will, turn corners practically in its own length, move sideways at an angle, and climb mountains, or ride out South Polar storms.

As unique a self-propelled vehicle as was ever built by man, the "Snow Cruiser" will carry provisions for one year for a crew of 4 men, will carry a complete scientific laboratory and will make it possible by means of an

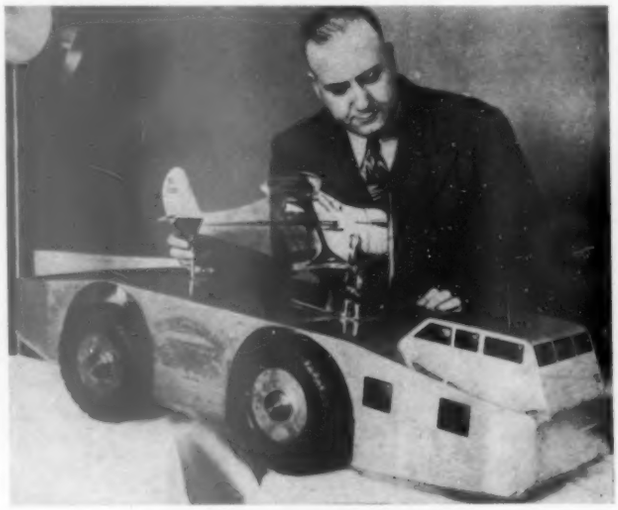

Fig. 1—Dr. Thomas C. Poulter demonstrating a model of the unique "Snow Cruiser" he has designed for Antarctic Expedition. Photo (Wide World).

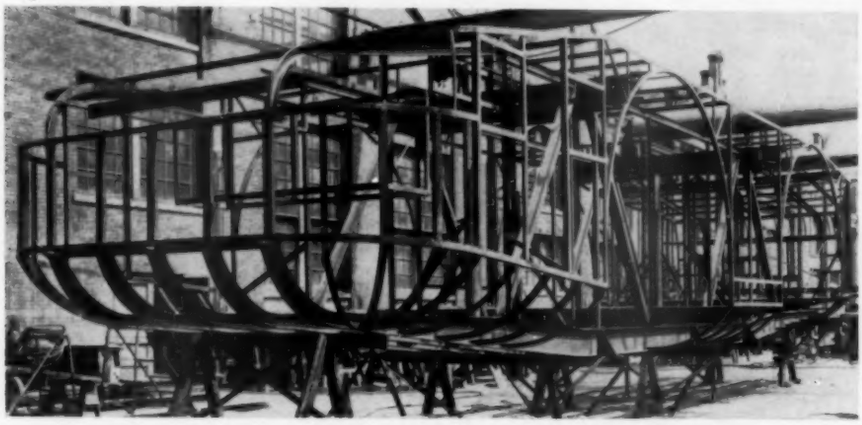

Fig. 2—"Snow Cruiser" in the early stages of its construction, showing how frame was assembled. About 8 tons of low-alloy high-tensile steel will be used. Photo (Lincoln Electric Co.).

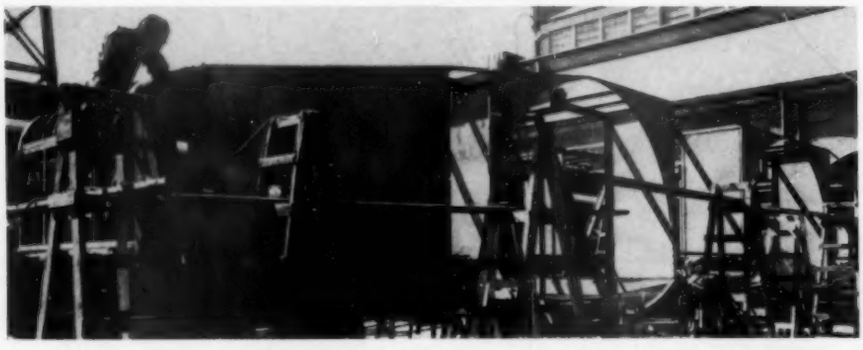

Fig. 3—Arc welding helped to give the "Snow Cruiser" the 5,000-mile cruising range desired by Dr. Poulter. No excess weight allowed. Photo (Lincoln Electric Co.).

airplane transported on its top deck, to explore a strip of territory 600 miles wide. The airplane can be unloaded and prepared for flight in 10 min. and loaded again in the same short span of time, it is claimed. Capable of traversing 15-ft. crevasses, propelled by any one or all four individually-driven wheels, the "Snow Cruiser" unit will be able to map and explore in one month more territory than all previous Antarctic expeditions combined, it is claimed.

This expedition is expected to get under way some time around October 15, 1939. Estimated cost of the "Snow Cruiser" is $150,000, complete with scientific equipment.

Design and construction of the 55-ft. mobile monster was directed and carried out toward one very desirable end—to obtain the strongest possible structure with least possible weight. Each two pounds of added weight means a sacrifice of one mile in cruising range. Greatest strength with least weight was obtained by use of high-tensile steel structural members, fused into one homogeneous structure by means of electric arc welding. Lincoln "Shield-Arc 85" welding electrodes, developed for welding high-tensile steel, and Lincoln arc welding generators, are being used exclusively in its fabrication.

If conventional riveted construction had been employed, it is estimated that the weight would have been at least 30% greater. This excess weight would have cut the cruising range.

The work of assembly began with the laying of the 5 longitudinal strength members, which are standard 12-inch I-beams, slit lengthwise of the web, vee'd to a taper, then arc welded to provide one-piece members which may be seen in Fig. 3. This is a unique construction made possible only by welding. From this point, construction became a matter of assembling the structure a part at a time, first tack welding each additional part into the structure until alignment could be checked and then permanently fusing the parts into the whole with full-penetration finishing welds.

Three sizes of electrodes for high-tensile steel are being used for the welding. The ⅛-in. size is being used for tack welding and light gauge work, 5/32-in. for the bottom shell and medium thicknesses, and 3/16-in. for the heavy welding. Approximately 550 lbs. of electrodes will be required for construction.

Arc welding will also be an important adjunct to the polar vehicle's permanent equipment. A Lincoln arc welding generator, of 200-amp. capacity, fitted for belt drive, will be permanently installed, together with a kit of Lincoln welding electrodes. The welder will be a necessary tool for the cruiser's machine shop, where it will be used for all sorts of necessary repairs, such as welding of broken or worn machine or structural parts, fabrication of miscellaneous devices and equipment. Indispensable in many ways, the welder may be used for charging batteries and for supplying power to raise or lower the wheels. It may also prove a vital aid in case of emergency since it can supply current for lighting or for operating tools, or for starting the diesel engines with which the "Snow Cruiser" is to be equipped.

Welding a "classifier" for a coal pulverizer which was later installed in the Southwest Sewage Treatment Works, Sanitary District of Chicago. Photo (General Electric Co.).

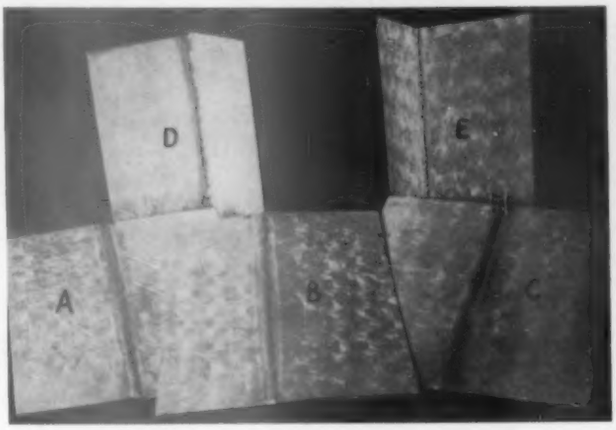

Fig. 1—Joints for carbon arc welding of galvanized steel. A—offset lap joint; B—lap joint; C—Butt joint; D—outside corner joint; E—inside fillet weld.

Carbon arc welding process for

Light Galvanized Sheets

★ This procedure obtains an excellent bond with minimum heat and least disturbance to galvanized coating—Current as low as 20 amp. for lighter gauges

By G. G. LANDIS
Chief Engineer, The Lincoln Electric Co., Cleveland, Ohio

CARBON ARC WELDING opens up a new field for application of welded construction by making it possible to obtain excellent results in the fabrication of galvanized steel in thicknesses lighter than 20-gauge.

In the past, sheet metal workers, tin shops, heating and piping contractors, and others employing galvanized sheets, have continued using old-fashioned mechanical methods, because of a feeling that the heat of welding would disturb the galvanizing unduly and have other effects which would impair quality of work. The sheet metal industry has thus been missing the cost and time savings which are inherent in the welding process. Now, it is expected that such shops will begin to obtain the benefits available.

The one great advantage of carbon arc welding as applied to galvanized steel is the fact that it permits obtaining an excellent bond with minimum heat and, thus, the least possible disturbance to the galvanizing.

For satisfactory results, the carbon arc welding of galvanized steel must be done with direct current. Only with direct current can uniformly straight polarity (which is absolutely essential in this work), be obtained. Straight polarity (where the current flows from the electrode to the work), provides an arc which is easy to strike and hold with the carbon. The uniform direction of current flow also makes it easy to move the arc along the seam being welded. The uniformly straight polarity of direct current also assures maximum welding speed and welds which are free from irregularities. Such welds are smooth and dense.

Also important in welding thin galvanized sheet is accurate control of voltage and current to give the proper type and size of arc. The importance of accurate control is appreciated from

Fig. 2—Galvanized sheets tack welded preparatory to welding.

the fact that a difference of only approximately a few amperes of current is required for best welding of 20- and 22-gauge metal. The ability to make adjustments in increments as fine as desired frequently spells the difference between good and inferior welding of galvanized steel.

Galvanized steel is welded by the carbon arc method by using a carbon of 5/32 in. diameter on thicknesses lighter than 16-gauge. For 16-gauge and over, carbons of 3/16 in. diameter will be found suitable. Current for welding will vary from 50 amp. for the heavier thicknesses down to 20 amp. for the lighter gauges.

It is important to use a carbon which has a long, thin taper. It will be found best to take a standard 5/32-in. carbon and grind it on an emery wheel so that it has a 4- or 5-in. taper down to a very small point. The carbon will keep itself necked down and tapered if it is gripped in an electrode holder about 1½ in. from the point. The filler metal is usually a rod composed of a copper-silicon-manganese alloy such as Everdur, etc. A 3/32- or 1/16-in. rod are usually used.

Fig. 3—Plain butt weld in galvanized made by carbon arc method.

Fig. 4 — Miscellaneous galvanized fittings carbon arc welded.

Fig. 5 — A galvanized steel tank being fabricated by carbon arc welding.

In the carbon arc welding of galvanized, the filler metal is laid on the joint at about a 10-deg. angle. The arc may be struck with the carbon anywhere on the plate and held until it becomes incandescent. This produces a glow which illuminates the work and makes it possible to move the carbon along the plate without actually establishing an arc. The arc should not be established until the carbon reaches the end of the filler rod. An added advantage of this method is that it eliminates any small sparks and avoids damage to the filler metal.

A very short arc is used. It is held in a way which keeps it from "going out." The arc is held easily and can be advanced without difficulty along the seam. Always play the arc on the filler metal and not on the galvanized plate. If a suitably short arc and correct heat are used, the welds will be extremely smooth and have the appearance of automatic production.

Carbon arc welding has been found more effective with certain types of joints than with others. The following five joints are listed in the order of their relative ease of welding:— (1) offset lap joint; (2) lap joint; (3) butt joint; (4) outside corner joint; and, (5) inside fillet. These various joints are illustrated by the photos in Fig. 1.

The best type of joint is provided when the work is passed through a roll or a press brake and given an offset lap. This type enables the weld metal to flow practically like solder. In addition, it has the added advantage on sheet metal work of acting as a stiffener in preventing warping.

The extra operation of offsetting may be economically out of the question in some instances as, for example, on contract work. In such cases it may be necessary to use a straight lap, such as that illustrated at *B*, Fig. 1. This type of welding is readily made. It is only necessary to tack weld the edges together with the carbon arc every few inches before actually starting the weld. (See Fig. 2.) This arrangement saves the welding and prevents the seam from opening up.

When properly done, the carbon arc welding of galvanized sheet steel (see Fig. 3), produces welds having a tensile strength equal to the sheet steel and a resistance to corrosion which, to all intents and purposes, is equal to galvanized sheet. This is true in the case of both the top, or weld side, and the side opposite the weld.

To obtain good results in arc welding galvanized steel it is only necessary

to keep the heat low enough so that the galvanizing is not lifted off and also to play the arc on the filler metal.

Accompanying illustrations show examples of work recently done in galvanized sheet steel by the carbon arc welding process. In Fig. 4 are illustrated various fittings. Fig. 5 shows a galvanized steel tank being fabricated by this method.

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Welded Steel Subway Tunnels For Chicago River Crossing

★ Welded steel fabrication played an important part in the twin tunnel river crossing project for the new State St. subway under construction in Chicago. Accompanying illustrations show the welded steel portion of the huge subway section that will soon be placed under the Chicago River. This twin tube was fabricated and erected by Graver Tank & Mfg. Co., Inc., East Chicago, Ind. The steel plates for this job were fabricated at the Graver plant and shipped to a Chicago dry dock. There they were erected into place and arc welded. The drydock was used as a construction site so as to permit eventual floating of the tube after completion.

The Graver contract covered the building of the steel tunnel, consisting of twin tubes, the dimensions of each tube being 17 ft. 9 in. wide by 20 ft. high. These tubes were designed with convex sides in order to resist external pressure. The bottom portion of the tube was constructed with a 16 ft. radius. The two adjacent sides of the twin tubes are 8 ft. 4½ in. high, this portion being flat. The crown of each tube has an 8 ft. 9 in. radius which transcends into a 20 ft. radius for the external sides. Each of the twin tubes was reinforced with structural frames, the over-all dimensions of these frames being 22 ft. 9½ in. high by 39 ft. 6 in. wide. These frames are spaced approximately on 12-ft. centers throughout the entire length of the 200-ft. twin tubes.

The internal portion of the twin tubes is supplied with additional braces in a tee bar section and holes are provided in the stem of these tee bars, as well as in a portion of the frames in order to insert reinforcing rods for application of concrete.

One of the stipulations in connection with this contract was the requirement that these tubes must be erected with a minimum lateral or misalignment of ¼ in., and as the fabricated material was to be shipped from the plant in sections and erected in the dry dock, it was of paramount importance that the design of these units be made in such a manner as to afford the field engineer an opportunity to adjust the various parts in order to maintain this alignment. In designing the various plates for the tube shell itself, which was 5/16 in. thick, a method was employed which would permit welding operators to make proper adjustments in the field.

Due to the fact that the lower or

Bottom portion of each tube was constructed with a 16-ft. radius. Erection was handled in a Calumet River drydock, so that the completed tunnel section could be floated to its destination. Photo (Graver Tank & Mfg. Co.).

The twin subway tubes are reinforced with structural frames spaced about on 12 ft. centers. Total length of tubes is 200 ft. Photo (Graver Tank & Mfg. Co.).

Looking at end of twin-tube structure before bulkhead was welded on. Design was so worked out that the job required practically no overhead welding in any portion. Bottom plates were only 1 ft. above floor of dry dock. Photo (Graver Tank & Mfg. Co.).

floor portion of the tube was only 12 in. above the floor of the dry dock, where erection was taking place, it was practically impossible to effect any overhead welding due to the restricted distance; therefore the design was worked out in such a manner that there was practically no overhead welding in any portion. Each end of the tunnel was supplied with bulkheads 5/16 in. thick, these bulkheads being braced internally with 21 in. wide-flange beams. After these were installed and all welding completed, the entire unit was given an air test of 8 oz. per sq. in.

The entire weight of steel work was approximately 525,000 lbs. It was very important that an accurate figure be obtained as to the weight of steel and concrete in order that the twin tube would float. That is the weight of the entire structure had to be considerably less than the weight of the water displaced by it.

After completion of erection and welding of steel plates, reinforcing steel bars are to be inserted in holes drilled for that purpose. These bars will run the entire length of the tube, both inside and out. Wood forms will then be built and concrete will be poured over the interior and exterior surfaces. Steel bulkheads will then be placed at each end to facilitate towing the tube 15 miles up Lake Michigan and into the Chicago River to the State Street crossing. The total weight of the completed one-piece tunnel section will be more than 6,500 tons which will include 200 tons of steel.

After the tube is towed to the State Street river crossing it will be sunk to a depth of 30 ft. below the river bed and will rest in a channel dug to that depth. During the sinking process it will be held in position by hooks extended from heavy steel cables, controlled by barges anchored on the surface. Once in place, it will be connected to tube sections leading from under the river. This will be accomplished by placing each end of the underwater tube into a large cofferdam where connections with landing sections will be made in dry ground.

Subway engineers say that the river crossing project is the most intricate engineering job involved in the entire Chicago subway system. It was decided to sink the tube in place rather than to attempt to tunnel under the river due to the fact that by building the tube first and sinking it from the river level only five feet of earth will be required to cover the top. If the tunnel method were employed it would be necessary to bore at least 15 ft. under the river bottom to prevent a blow-out resulting from the tremendous air pressure used in tunneling.

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AMERICAN INSTITUTE OF STEEL CONSTRUCTION will hold its seventeenth annual convention at the Waldorf-Astoria Hotel in New York City on October 17 and 18. Delegates from all important shops fabricating and erecting structural steel shapes in the United States will be present. E. T. WEIR, chairman of the board of National Steel Co., will make the banquet address on Tuesday evening, October 17. There will also be two special luncheon meetings—that on October 17 will be addressed by A. D. WHITESIDE, president of Dun & Bradstreet, and that on October 18 will be addressed by PAUL G. HOFFMAN, president of Studebaker Corp.

Arc welding top section of grinding chamber of a cage mill for the Southwest Sewage Treatment Works, Sanitary District of Chicago. Photo (General Electric Co.).

A.W.S. convention headquarters will be at the Stevens Hotel. View looking north from Grant Park.

Well diversified technical program planned for

Annual A. W. S. Meeting

★ Program selection of members will be facilitated by holding simultaneous technical sessions—Meetings at Stevens Hotel will include a total of 56 papers at 16 sessions

THE QUICKENING PACE of the steel industry, owing to the threat of inflation and possibility of war business from belligerent nations in Europe, focuses considerable attention upon the forthcoming 20th annual meeting of the American Welding Society, which will be held during Convention Week in Chicago, October 22-27, 1939. Advance estimates indicate that at least 1,000 welding engineers and production men interested in welding will attend this convention. The growing interest displayed in welding and cutting processes, coupled with the recent upswing in industrial activity, which has boosted the current steel-making activity to 80 per cent of capacity, indicates that all the technical meetings of A.W.S. at the Stevens Hotel will be well attended. Other technical societies cooperating in the National Metals Congress are the American Society for Metals, with headquarters at the Palmer House; the Wire Association with meetings at the Congress Hotel; and the Iron and Steel and Institute of Metals Divisions of the American Institute of Mining and Metallurgical Engineers with headquarters at the Blackstone Hotel.

Visitors to Chicago, the second largest city in the nation, and very important industrially because of its vast Calumet district and Gary, Ind. steel producing and steel fabricating plants, will be impressed with the fact that Chicago symbolizes the modern tempo and magnitude of industrial production. The Gary Works of Carnegie-Illinois Steel Corp., for example, is conceded to be the world's largest steel plant.

President Harry C. Boardman will call the 20th Annual Meeting to order Monday morning, October 23, at which time David Levinger, assistant to vice-president and works manager at the Hawthorne Plant of Western Electric Co., will deliver a keynote address and welcome members and guests to Chicago. Following this will come the presentation of A.W.S. award medals, but at the time of going to press winners of these medals have not been announced. The two technical papers and motion picture to be presented at the Monday morning session will deal with welding applications in government construction work. Commander C. A. Trexel of the Bureau of Yards and Docks, Navy Department, will speak on

Economy of materials and reduction in weight of huge 600-hp. diesel engines is accomplished by means of arc welded fabrication of steel sections flame-cut from rolled steel plates. This departure in the building of heavy diesel engines was pioneered by Electro-Motive Corp., LaGrange, Ill., in building engines for their high-speed diesel-electric locomotives. An excellent example of the type of machinery fabrication now made possible by means of welding. Shown watching the welders "knit" the sections together, are (left to right): Ernest Kuehn, works manager of Electro-Motive Corp., Eugene A. Balsley, chairman of Chicago Section, American Welding Society; and Harry C. Boardman, national president of the same Society. Photo (Electro-Motive Corp.).

welded structures coming under his jurisdiction, while Paul L. Heslop and Fred T. Downing of the U. S. Army Engineer Corps will present a paper detailing the uses of welding in construction of Bonneville Dam. Following this a motion picture will be presented on construction work at Grand Coulee Dam.

Simultaneous technical sessions are scheduled for each day of the five-day meeting, both morning and afternoon, with the exception of Thursday afternoon and Friday afternoon. Only committee meetings are scheduled for Thursday afternoon in order to permit members and guests to attend the National Metal Exposition in the International Amphitheatre at 4200 South Halsted St. Examination of the tentative program, which is presented on the following pages, reveals that technical papers will cover a wide field of welding research and industrial applications. Sessions have been planned to deal with production welding of light-gauge material; machinery construction; heavy equipment construction; flame-hardening and hard-surfacing; welded piping, pressure vessels, and boilers; welding and cutting in steel mills; structural steel and shipbuilding; railroad equipment and maintenance of way welding; and two sessions dealing with resistance welding applications. The Chicago annual meeting will be particularly noted for the fact that a total of eight resistance welding papers are to be presented at the morning and afternoon technical sessions on Wednesday, October 25.

Annual Business Meeting

The annual business meeting is scheduled for Friday morning at 11:20 a.m. President Harry C. Boardman will present his annual report and the following nominees will be formally inducted into office as duly-elected officers for the 1939-1940 term:

President—G. T. Horton.
First Vice-President—T. C. Smith.
Second Vice-President—L. S. Moisseiff.
District Vice-President: New York and England—W. F. Hess; Middle Eastern—L. C. Bibber; Middle Western—K. L. Hansen; Southern—A. J. Moses; Pacific Coast—L. W. Delhi.
Directors-at-Large—E. V. David, J. D. Gordon, G. F. Jenks and H. S. Smith.

The board of directors will hold a luncheon meeting immediately following the annual business meeting on Friday.

Members and guests are urged to register immediately upon arrival at A.W.S. headquarters in the Stevens Hotel. They will receive a convention badge admitting them to technical sessions and the Metal Show. There will be no registration fee for either members or guests, but a charge of 50c for members and $1.00 for non-members will be made for copies of technical papers.

Through the courtesy of Electro-Motive Corp., of La Grange, Ill., a subsidiary of General Motors Corp., members and guests will have an opportunity to make an inspection trip to this most modern plant devoted to the

Stevens Hotel (left) and Buckingham fountain in Grant Park, enhance the beauty of Chicago's lake front skyline.

manufacture of diesel-electric locomotives for railway passenger and freight service. This trip will afford visitors a rare opportunity to witness a wide variety and considerable volume of welding activity. Arrangements have been made to transport visitors from the Stevens Hotel to the La Grange plant and return by means of special buses.

Those who are able to arrive in Chicago on Sunday, October 22, should avail themselves of the opportunity to attend the President's Reception in the Tower Ballroom from 5 to 7 p.m. Members and guests will be greeted by Mr. and Mrs. Harry C. Boardman and will probably meet the president-elect, George T. Horton, as well as the other newly-elected officers for 1939-1940. The annual dinner is scheduled for 7 p.m. Thursday evening in the Boulevard Room of the Stevens. It is reported that a speaker of national prominence will address the dinner group, but owing to difficulties encountered, no definite announcement can be made regarding the speaker's name and subject at this time. There will be singing by the Purdue University Glee Club and also music, followed later in the evening by dancing with Don Fernando and his orchestra.

A very unique party has been planned for Wednesday night, October 25, also in the Boulevard Room at the Stevens. From well informed sources we have learned that this will be a decidedly peppy and highly entertaining "stag party." Its press agent calls it "A Night Shift in the Weldery," and discloses that those who will dig up a $1.00 to purchase an admission ticket will be able to "see them unshielded" without "cover beads or fixtures."

An entertainment program is also being planned for the ladies attending the A.W.S. 20th annual meeting. This is being arranged jointly with the American Society for Metals and will include a number of escorted tours to points of interest in Chicago.

A complete tentative program of the October meeting is given on this and following pages.

MONDAY—OCTOBER 23rd

9:30 A.M.—Morning Session—North Ballroom

Chairman: HARRY C. BOARDMAN, president of A.W.S. and research engineer, Chicago Bridge & Iron Co., Chicago, Ill.
Vice-Chairman: C. A. MCCUNE, treasurer of A.W.S. and with Magnaflux Corp., New York City.

Keynote address by DAVID LEVINGER, assistant to vice-president and works manager, Western Electric Co., Chicago, Ill.
Presentation of A.W.S. Award Medals.

GOVERNMENT CONSTRUCTION WORK

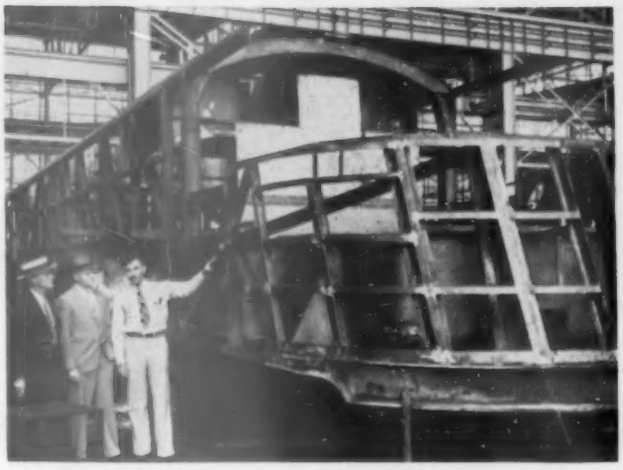
"Welded Structures Under the Bureau of Yards and Docks, U. S. Navy," by Commander C. A. TREXEL, Bureau of Yards and Docks, Navy Department.
"Bonnesville Dam Presents Varied Uses of Welding," by PAUL L. HESLOP and FRED T. DOWNING, Corps of Engineers, U. S. Army.
"Motion Picture on Grand Coulee Dam."

2:00 P.M.—Simultaneous Technical Sessions—(A) South Ballroom

INDUSTRIAL RESEARCH

Chairman: G. F. JENKS, Col. Ordnance Dept., U. S. Army.
Vice-Chairman: C. H. JENNINGS, Westinghouse Electric & Mfg. Co.

"Weld Hardening of Carbon and of Alloy Steels," by H. J. FRENCH and T. N. ARMSTRONG, International Nickel Co.



Welded structural frame of a new diesel-electric locomotive under construction. This is the type of motive power used on many of the high-speed streamliners which are recapturing a profitable volume of passenger traffic for the railroads. Shown inspecting the novel structural design are (left to right): E. A. Balsley, Chairman of Chicago Section, American Welding Society; H. C. Boardman, national president of the same Society; and Chas. Dreutzler, welding foreman in the LaGrange, Ill., plant of Electro-Motive Corp. Photo (Electro-Motive Corp.).

ASK ELMER!
NIGHT SHIFT IN THE WELDERY!
SEE THEM
UNSHIELDED
— 6 —
QUALIFIED OPERATORS!
NO COVER BEADS! NO FIXTURES!
WEDNESDAY NIGHT—OCTOBER 25, 1939
10 P.M. TO 1 A.M.
BOULEVARD ROOM — STEVENS HOTEL — CHICAGO
FOOD — ENTERTAINMENT — REFRESHMENT
MEN ONLY
ADMISSION $1.00
ASK ELMER!

One of 28 new light-weight passenger cars being built for the Southern Pacific Railroad's "Daylight" train, running between San Francisco, Calif., and Los Angeles. These new streamlined cars are fabricated by welding using low-alloy high-tensile steels to effect important weight economies. Side frames are of welded truss-type construction. At the left is F. M. Gunn, works manager of Pullman-Standard Car Mfg. Co., Chicago. Also watching the welder are L. S. McPhee, vice-chairman, Chicago Section of American Welding Society; and A. M. Unger, welding engineer of Pullman-Standard. Photo (Pullman-Standard Car Mfg. Co.).

Giant excavating machines, such as shovels, draglines, cranes, etc., are now built better by means of welding. Here is a lower frame assembly for a newly designed Link-Belt 2½ yd. crawler crane. The entire structure is fabricated by welding rolled steel sections (flame cut from plate). Thicknesses of plate used is mostly 1¼ in. The cross axles are made of low-alloy high-tensile steel (1¼ in. thcik). H. C. Longwell (in shirt sleeves), superintendent of steel fabrication, Link-Belt Co., Chicago plant, is shown describing some of the advantages of the welded design to (left) Harry C. Boardman, national president of the American Welding Society and L. S. McPhee, vice-chairman of Chicago Section, American Welding Society. Photo (Link-Belt Co.).

"An Investigation of the Spot Welding of Automobile Grade Mild Steel," by W. F. HESS and R. A. WYANT, Rensselaer Polytechnic Institute.

"Failure of Aluminum Subjected to Combined Stresses," by JOSEPH MARIN, Rutgers University.

"Fatigue Tests of Welded Joints in Structural Plates," by W. M. WILSON and A. B. WILDER, University of Illinois.

2:00 P.M.—Simultaneous Technical Sessions—(B) North Ballroom

PRODUCTION WELDING IN LIGHT GAGE MATERIAL

Chairman: R. E. MCFARLAND, Western Electric Co.
Vice-Chairman: E. A. BALSLEY, Chairman, Chicago Section.

"Welding Propeller Shaft Tubing for Automotive Industry," by G. C. GRIDLEY, Universal Joint Division, Borg-Warner Corp.

"Machine Welded Sheet Metal Parts for Enameling," by JOSEPH C. LEWIS, Associated Engineers, Inc.

"Automatic Oxy-acetylene Welding of Oil Floats," by H. E. LERNER, Taylor Sales Engineering Company.

TUESDAY—OCTOBER 24th

9:30 A.M.—Simultaneous Technical Sessions—(A) South Ballroom

FUNDAMENTAL RESEARCH

Chairman: J. J. CROWE, Air Reduction Sales Co.
Vice-Chairman: MILTON MALE, U. S. Steel Corp. of Delaware.

"Reactions in Arc Welding," by R. DAVID THOMAS, JR., Arcos Corp., and F. H. RHODES, Cornell University.

"Arc Welding in Controlled Atmospheres," by G. E. DOAN, Lehigh University.

"Effect of Alloying in Metallic Arc Welding," by R. W. EMERSON, Westinghouse Electric & Mfg. Co.

"Manganese in Rutile-Type Coated Steel Electrodes," by E. G. ENCK, Foote Mineral Co.

"Creep Tests of Arc-Welded Low-Carbon Steel," by N. F. WARD, University of California.

9:30 A.M.—Simultaneous Technical Sessions—(B) North Ballroom

MACHINERY CONSTRUCTION

Chairman: A. E. GIBSON, The Wellman Eng. Co.
Vice-Chairman: C. M. UNDERWOOD, U. S. Naval Gun Factory.

"Use of Steel Castings and Rolled Steel Plate in Welded Fabrication," by H. J. SHIFFLI and E. L. KREJCI, American Steel Foundries.

"Plate Edge Preparation for Welding," by H. E. ROCKEFELLER, The Linde Air Products Co.

"Flow of Materials in Production Welding," by W. W. PETRY, Cincinnati Milling Machine Co.

"Welding Heavy Presses," by L. J. MCDONOUGH and J. R. HENRY, Clearing Machine Corp.

2:00 P.M.—Simultaneous Technical Sessions—(A) South Ballroom

FUNDAMENTAL RESEARCH

Chairman: K. L. HANSEN, Harnischfeger Corp.
Vice-Chairman: A. M. CANDY, Hollup Corp.

"Further Studies of Spot Welding of Low-Carbon and Stainless Steels," by W. F. HESS and R. A. WYANT, Rensselaer Polytechnic Institute.

ANNUAL DINNER

AMERICAN WELDING SOCIETY

BOULEVARD ROOM — STEVENS HOTEL CHICAGO

7:00 P.M.—THURSDAY, OCTOBER 26, 1939

TOASTMASTER AND SPEAKER OF NATIONAL PROMINENCE

SINGING BY

PURDUE UNIVERSITY GLEE CLUB CHICAGO MUSIC FESTIVAL WINNERS

DANCING AND MUSIC DON FERNANDO AND HIS ORCHESTRA

PRICE—$4.00 PER PLATE

An underframe for another diesel-electric streamlined locomotive takes shape rapidly with skilled arc welders using their electric "knitting needles" to join the rolled steel members into a rigid frame, strong enough to support the heavy power equipment needed for high-speed operation. This design provides maximum strength and rigidity without adding unnecessary weight to equipment. Shown watching one of the welders are (left to right): Eugene A. Balsley, chairman of Chicago Section, American Welding Society; H. C. Boardman, national president of the same Society; and Ernest Kuehn (pointing), works manager of Electro-Motive Corp., LaGrange, Ill.

When finished, this huge welded assembly will serve as a "boom" for an earth-digging crawler crane, capable of gulping up 1¼ cu. yds. of material in one bite. Construction machines, such as shovels, draglines, cranes, etc., are better built today by means of welding. This "boom" is made by welding rolled steel sections (flame-cut from plate). It is about 30% lighter in weight than the riveted design previously used. The welding is being witnessed by Eugene A. Baisley, chairman of Chicago Section, American Welding Society, and Harry C. Boardman, national president of same Society. Photo (Link-Belt Co.).

"Application of Proximity Effect to Welding," by E. BENNETT, University of Wisconsin.

"Contact Resistance," by F. J. STUDER, Union College.

"Weld Inspection by Means of Trepanned Plugs," by W. T. TIFFIN, University of Oklahoma.

"Welding of Copper," by A. P. YOUNG, Michigan College of Mining & Technology.

2:00 P.M.—Simultaneous Technical Sessions—(B) North Ballroom

WELDING IN EQUIPMENT CONSTRUCTION

Chairman: J. W. OWENS, Fairbanks-Morse Co.
Vice-Chairman: O. T. BARNETT, Black, Sivalls & Bryson, Inc.

"Fabrication of Road Building Equipment," by L. L. BURGER, LaPlant-Choate Mfg. Co. Inc.

"Designing Construction Machinery for Production by Welding," by H. C. HETTELSATER, Harnischfeger Corp.

"Cutting and Welding Stainless Steel Clad Steel," by W. B. KEELOR, Farwell Metal Fabricating Div., Farwell, Ozmun, Kirk & Co.

"Large Equipment Fabrication," by LESLIE MCPHEE, Whiting Corp.

WEDNESDAY—OCTOBER 25th

9:30 A.M.—Simultaneous Technical Sessions—(A) South Ballroom

FLAME HARDENING AND HARD SURFACING

Chairman: M. M. WEIST, Air Reduction Sales Co.
Vice-Chairman: R. S. KENRICK, The Welding Engineer.

"Flame Hardening the Way Surfaces of Machine Tools," by FRED C. DULL, The Monarch Machine Tool Co.

"Hard Facing by Fusion Welding," by T. B. JEFFERSON, Marine Design Section, Office of Chief of Engineers, War Dept.

"Flame Treating," by J. H. ZIMMERMAN, The Linde Air Products Co.

"Flame Hardening from Standpoint of Commercial Heat Treater," by W. G. HAMILTON, Accurate Steel Treating Co., Inc.

9:30 A.M.—Simultaneous Technical Sessions—(B) North Ballroom

RESISTANCE WELDING

Chairman: G. S. MIKHALAPOV, Heintz Mfg. Co.
Vice-Chairman: D. H. COREY, Detroit Edison Co.

"Some Applications of Resistance Welding Process," by C. L. PFEIFFER, Western Electric Co.

"Precision Welding by Resistance Method," by E. J. BATES, G. J. OSWALD and R. L. HOUS, The National Cash Register Co.

"Spot Welding of Aluminum," by R. KAUFFMANN, Aluminum Francais.

"Some Studies of Flash Welding," by M. G. YATSEVITCH, Watertown Arsenal.

2:00 P.M.—Simultaneous Technical Sessions—(A) South Ballroom

WELDED PIPING, PRESSURE VESSELS AND BOILERS

Chairman: D. S. JACOBUS, The Babcock & Wilcox Co.
Vice-Chairman: E. VOM STEEG, JR., General Electric Co.

"Welding of Boiler Drums and Pressure Vessels," by R. T. KERNOLL, Edge Moor Iron Works.

"Oxy-acetylene Welding Red Brass Pipe," by A. N. KUGLER, Air Reduction Sales Co.

"90° Welded Nozzles, Piping—Calculations, Design and Fabrication," by F. C. FANTZ and W. G. HOOPER, Midwest Piping & Supply Co. Inc.

"Extensions of Fusion Welding in Special Pipe and Pipe Fitting Applications," by E. HALL TAYLOR, Taylor Forge and Pipe Works.

2:00 P.M.—Simultaneous Technical Sessions—(B) North Ballroom

RESISTANCE WELDING

Chairman: J. D. GORDON, The Taylor Winfield Corp.
Vice-Chairman: M. S. CLARK, Federal Machine & Welder Co.

"Engineering Fundamentals of Resistance Welding," by S. M. HUMPHREY, The Taylor Winfield Corp.

"High Speed Welding Assemblies," by E. W. FORKNER, Federal Machine & Welder Co.

"Application and Use of Portable Spot Welders," by C. E. HEITMAN, Edward G. Budd Mfg. Co.

"Latest Developments in Resistance Welding," by R. T. GILLETTE, General Electric Co.

10:00 P.M. to 1:00 A.M.—"Night Shift in the Weldery" (Chicago Section, Stag Party)—Boulevard Room

THURSDAY—OCTOBER 26th

9:30 A.M.—Simultaneous Technical Sessions—(A) South Ballroom

CUTTING AND WELDING IN STEEL MILLS

Chairman: L. C. BIBBER, Carnegie-Illinois Steel Corp.
Vice-Chairman: H. E. ROCKEFELLER, The Linde Air Products Co.

"Repairs to Castings and Other Steel Mill Parts," by S. S. BAUMER, Bethlehem Steel Co.

"Welding in a Steel Mill," by R. P. PALMER, Wheeling Steel Corp.

"Flame-Descaling and Flame Cleaning and Dehydrating," by J. G. MCGRATH, Air Reduction Sales Co.

9:30 A.M.—Simultaneous Technical Sessions—(B) North Ballroom

WELDING IN STRUCTURAL AND SHIP WORK

Chairman: EVERETT CHAPMAN, Lukenweld, Inc.
Vice-Chairman: A. G. BISSELL, Bureau of Construction and Repair, Navy Dept.

"High Spots in Ship Welding," by E. D. DEBES, Bethlehem Shipbuilding Corp.

The International Amphitheatre, 4200 South Halsted St., Chicago.

Convention week in Chicago
will draw welding men to

National Metal Exposition

★ As in past years, welding and cutting exhibits will be high spots of the big "Metal Show"—Reports indicate over 225 exhibitors will take space

At this writing a total of 227 of the nation's leading metal producers and equipment manufacturers in the metal fabricating field have signed up for exhibit space at the National Metal Exposition to be held in Chicago during Convention Week, October 23-27. All exhibits will be in the International Amphitheatre, 4200 S. Halsted St. This annual display is widely recognized as one of the country's largest industrial expositions. All of the latest developments in welding and cutting, metallurgy, heat-treating and fabricating will be depicted by means of ingenuous displays and working models and demonstrations. Arrangements have been made for special bus transportation service between the downtown hotels and the Amphitheatre on Chicago's South Side.

Scanning the list of 227 exhibitors, we find a total of 77 exhibits of special interest to welding engineers and men interested in the welding and cutting processes. In order to help our readers locate these welding exhibits, we have prepared a floor plan of the exhibit space showing the 77 selected exhibits by means of cross hatching on the individual exhibit spaces. This will facilitate location of any welding or cutting or metal exhibit. All of these exhibits form a very definite part of the program planned for Convention Week in Chicago.

The doors of the International Amphitheatre will be opened from 12 noon to 10 p.m. on Monday, Tuesday, and Wednesday (October 23-25), and from 12 noon to 6 p.m. on Thursday, October 26. On Friday, October 27, the exhibit hall will open at 9 a.m. and remain open until 10 p.m. It should be noted that only on Friday will the Metal Exposition be open during the forenoon.

From the imposing list of exhibitors it is quite evident that thousands of men interested in welding, heat-treating and metals will have an excellent opportunity to personally contact exhibitors' representatives who can be very helpful in the solution of practical problems.

This huge arena forms central exhibit area of the International Amphitheatre, where the National Metal Exposition will be held in Chicago, October 23-27.

Exhibits of Interest to Welding Men

(Based on information received as of September 22)

Acme Steel Co., Chicago, Ill. (Booth K312)

EXHIBITING (in operation): The Acme Superstrip line of quality strip steels. Various hot and cold rolled parts and finished products in both plain and galvanized finishes will be on display to illustrate just a few of the items which can be manufactured from Superstrip. A sample section of a venetian blind with the slats formed from Colorstrip, the strip steel that is colored before forming, will be shown. Also included will be strip steel with designs rolled-in for use as decorative trim on products such as kitchen utensils, counters, trays, novelties, etc.

Air Reduction Sales Co., New York, N. Y. (Booth M319)

EXHIBITING: Will feature demonstrations of automatic welding, bronze welding, flame-hardening, flame-cutting, flame-cleaning and several other commercial applications of the oxy-acetylene flame. The Planograph, a new addition to Airco's extensive line of flame-cutting machines, will be demonstrated for the first time. Equipment for Airco flame-cleaning and dehydrating, a new process, will also be displayed. Bronze welding using rods coated with the new non-flaking flux, which is either applied right on the job in liquid form or as a factory coating, will be demonstrated. These coated Airco bronze rods insure the operator of strong, sound welds.

National Carbide's exhibit will consist mainly of a display of National Carbide in the red drum; National Carbide lights and lanterns will also be shown.

Allegheny Ludlum Steel Corp., Brackenridge, Pa. (Booth C117)

Aluminum Co. of America, Pittsburgh, Pa. (Booth G201)

EXHIBITING (in operation): Display of the commercial forms of Alcoa aluminum alloys available, together with interesting examples of commercial applications of these alloys. Also, a similar exhibit of Mazlo magnesium and its alloys, including examples of commercial applications.

American Brass Co., The, Waterbury, Conn. (Booth A104)

EXHIBITING: Will feature a welding booth where an Anaconda welding engineer will give demonstrations of gas and electric arc welding with Anaconda welding alloys. Among the rods which will be used for demonstrations will be Tobin Bronze, Everdur, and Anaconda 997 (low fuming) rod. In addition to welding demonstrations and displays of welding rods, there will be a general display of Anaconda copper and brass products, as well as parts fabricated from such special alloys as Everdur, Avialite, Beryllium Copper and Phosphor Bronze. There will also be displays of Anaconda pressure die castings and hot pressed forgings.

American Chain & Cable, Page Steel & Wire Div., Monessen, Pa. (Booth M323)

EXHIBITING: Will show both gas and electric welding wires. The welding wires will include Page Armco, Hi-Tensile shielded arc, low-carbon, medium-carbon, high-carbon, surface-saving and stainless steel. The stainless steel electrodes which will be featured are now available in 11 grades. Each grade is especially suitable for welding a specific grade of stainless steel. They are of the shielded arc type and may be used in flat, vertical or overhead welding. A heavy flux coating of special composition assures a weld deposit similar to the analysis of the metal being welded. Also on exhibit will be Page wire in the various analyses of carbon and stainless steels. Page wire is being made up in rounds, flats, rectangles, squares, and in special shapes. The exhibit will bring out the fact that Page is prepared to furnish wire to exacting requirements as to shape, analysis, and finish for a multitude of uses.

American Gas Association, New York, N. Y. (Industrial Gas Exhibit)

American Institute of Mining and Metallurgical Engineers, New York, N. Y. (Booth J320)

EXHIBITING: The varied fields of the professional activities of mining and metallurgical engineers in the mineral industries and an exhibit of publications.

American Machine & Metals, Inc., Riehle Testing Machine Div., East Moline, Ill. (Booth A117)

EXHIBITING (in operation): Riehle 110-220 foot-pound combination Izod-Charpy-tension impact testing machine. Riehle variable velocity impact testing machine. Riehle production Brinell hardness testing machine. Riehle 60,000 pound Model "505" universal hydraulic testing machine. Riehle 60,000 pound Model P-2 precision hydraulic universal testing machine.

By means of an intense oxy-acetylene flame this automatic cutting machine can quickly cut any desired shape from a flat steel plate. Production is doubled by using two torches in tandem, controlled from a master templet on the tracing table. An important cost-cutting tool similar to thousands in daily use in fabricating shops. The cutting operation is witnessed by (left to right): Harry C. Boardman, national president of the American Welding Society; Eugene A. Balsley, chairman of the Chicago Section, American Welding Society; and L. S. McPhee, vice-chairman of the same Society. Photo (Link-Belt Co.).

American Manganese Steel Co., Chicago Heights, Ill. (Booth N311)

EXHIBITING: Heat treating containers such as flexbox parts, carburizing boxes, pans, trays, covers, work carrying trays, malleableizing boxes.

American Rolling Mill Co., Middletown, Ohio. (Booth E101)

American Steel & Wire Co., Cleveland, Ohio. (Booth G205)

EXHIBITING: Refer to United States Steel Corp.

American Welding Society, New York, N. Y. (Booth C121)

EXHIBITING: Publications and technical books on welding. Literature will be available emphasizing the benefits of membership in the Society.

Arcos Corp., Philadelphia, Pa. (Booth L304)

EXHIBITING: Will feature a novel moving display showing the quality of stainless weld metal obtained from electrodes of their manufacture as well as stainless steel products fabricated by arc welding. Samples showing physical characteristics of all-weld metal and joints made of a wide range of analyses will be on display for close scrutiny. In addition, there will be available complete information on corrosion-resistant qualities of Arcos weld metal. Structure will be shown by micrographs. A feature will be the "weldsculpture" figure of all-welded stainless steel fabrication.

Automatic Gasflux, Inc., Cleveland, Ohio. (Booth D107)

Babcock & Wilcox Co., New York, N. Y. (Booth B107)

Baldwin-Southwark Corp., Philadelphia, Pa. (Booth D118)

Bastian-Blessing Co., Chicago, Ill. (Booth I205)

EXHIBITING: Will show its full line of welding and cutting equipment, including models which feature improvements in construction and performance. A feature of The Bastian-Blessing Co. exhibit will be an active demonstration of cutting steel with the new KX and KXX cutting torches, using various fuel gases. Other demonstrations will be made with welding torches, showing flame adjustability, welding of white metal and aluminum and a demonstration of a two-stage Regolator maintaining constant gas flow despite extreme fluctuations in supply pressure. Plans include staging a novel contest, giving away a Rego Torch as a daily prize.

Bethlehem Steel Co., Bethlehem, Pa. (Booth L319)

EXHIBITING: 1. Six dioramas illustrating the principal physical properties of Mayari R steel: (a) Corrosion resistance; (b) impact strength; (c) fatigue strength; (d) weldability; (e) increased pay load due to higher strength; (f) ease of fabrication. 2. Applications of Mayari R are featured in 32 transparencies covering automotive industries, railroads, mining, shipbuilding, oil fields, bridge construction, road building and excavating. 3. Parts of buses, freight cars and passenger cars, made of Mayari R. 4. Coils of 72 in. strip, hot and cold rolled, with a series of transparencies showing the principal operations in hot and cold rolling. This display also includes a number of stampings showing the deep drawing properties of the strip. 5. A testing laboratory to demonstrate hardenability of alloy steels. This display includes typical parts for which hardenability is a requirement, such as ring gears, drive shafts, hollow drill steel, etc. Electric furnace operations and electric heat treatment will be shown by means of transparencies.

Bliss & Laughlin, Inc., Harvey, Ill. (Booth M305)

EXHIBITING: Cold finished bar steels and shafting—carbon and alloy.

Carnegie-Illinois Steel Co., Pittsburgh, Pa. (Booth G205)

EXHIBITING: Refer to United States Steel Corp.

Chase Brass & Copper Co., Waterbury, Conn. (Booth L301)

EXHIBITING: Will exhibit interesting examples of welded and fabricated products of Chase brass, copper and bronze. Actual demonstrations of welding copper and Olympic Bronze will be held throughout the show. All types of difficult welds, butt welds, fillet welds and lap welds on copper, bronze and steel will be demonstrated. Among fabricated parts to be exhibited are Olympic bronze tanks and water heaters, welded copper bus tube assemblies, 12 in. welded Olympic bronze fittings and fabricated pipe, copper headers, copper fin tubing, brass forgings, Olympic bronze evaporators, deep-drawn shells, hot rolled angles and welding rods.

Chicago Steel Foundry Co., Chicago, Ill. (Booth C105)

Climax Molybdenum Co., New York, N. Y. (Booth L334)

Continental Roll & Steel Fdy., East Chicago, Ind. (Booth L330)

Compressed Industrial Gases, Inc.—Hollup Corp., Chicago, Ill. (Booth N331)

EXHIBITING (in operation): Compressed industrial gases, oxygen, acetylene and hydrogen; Automatic cutting machine; Victor oxygen, acetylene apparatus; Hollup electrodes; welding machines; and welding equipment and supplies.
chines; and welding equipment and supplies. A new CIG automatic cutting machine, revolutionary in design and scope will be introduced and demonstrated at this exhibit.

Detroit Testing Machine Co., Detroit, Mich. (Booth A113)

EXHIBITING (in operation): New 60,000 lb. capacity Universal testing machine. New long stroke (18 inch) Brinell machine with stationary table. No screw adjustment. Improved direct reading Brinell guaranteed to stand up under severest production conditions. No grinding or glass reading. Improved hand operated Brinell for high grade laboratory or percentage testing. Improved large capacity sheet metal or ductility tester.

Dow Chemical Co., Midland, Mich. (Booth M302)

EXHIBITING: Dowmetal magnesium alloys, such as sand castings; permanent mold castings; die castings; forgings; extruded shapes, bars, rods and tubes; and plate, sheet and strip.

Electro Metallurgical Co., New York, N. Y. (Booths L302, M301 and L305)

EXHIBITING: The importance of adding chromium to steels and irons so as to increase their resistance to heat, corrosion, and abrasion, and to enable them to meet rigid industrial standards of high strength and uniform hardness will be brought out at the exhibit. Various uses and particular advantages of chromium-bearing alloys in industry will be pointed out, and several parts made from such alloys will be on display. Information as to chemical composition of each part, where and how it is used, the temperature at which it operates, and other data will also be given. For instance, steel specimens containing up to 33 per cent chromium, which were held at various temperatures for 200 hours will show that the amount of oxidation which each specimen undergoes is in inverse proportion to the chromium content of the metal.

Federal Machine & Welder, Warren, Ohio. (Booth A137)

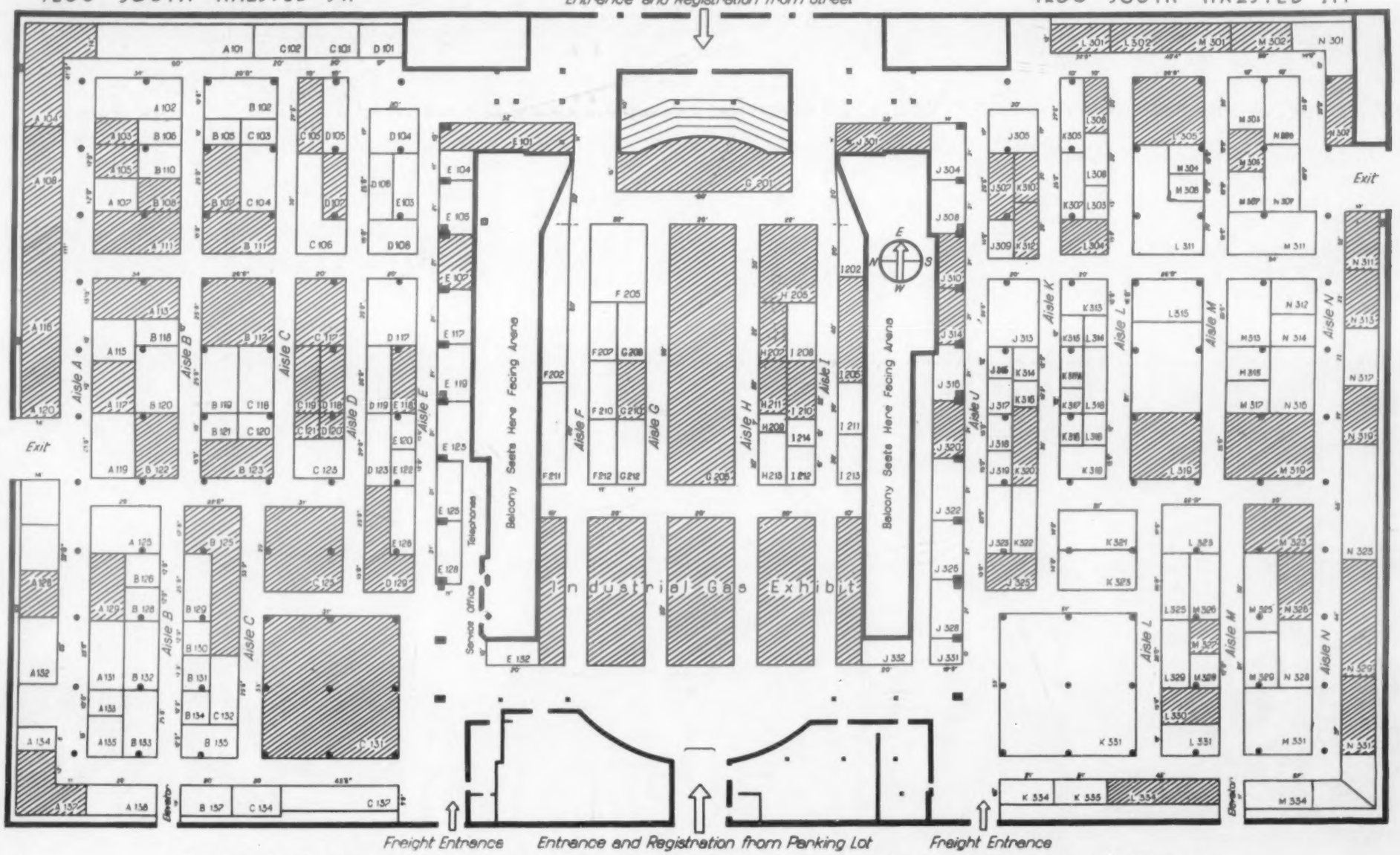
General Electric Co., Schenectady, N. Y. (Booths A118, A114, A111, A110 and A108)

EXHIBITING: Operating exhibits of electric heating and welding equipment will highlight General Electric's display. Alternating-current welding transformers, direct-current welding equipment, atomic hydrogen sets, and an operating display of thyratron temperature control for electric furnaces will be among the G-E apparatus shown. In addition, welding accessories and electrodes, and samples of electric furnace brazing and scale-free hardening will be exhibited. The General Electric X-Ray Corp. will also participate with a display of its products. A total of 25 General Electric representatives will be in attendance.

General Electric X-Ray Corp., Chicago, Ill. (Booth A120)

EXHIBITING: The new precision-built Model XRD will be the central feature of the exhibit. This model is a compact, versatile, safe apparatus for application of X-ray diffraction methods to a multitude of industrial and research problems. The unit is completely new in design, offering outstanding advantages never before embodied in such an apparatus, while retaining the best features of older designs. In addition to the diffraction unit, illuminated radiographs and diffraction patterns will be displayed.

Gordon Co., Claud S., Chicago, Ill. (Booth A113)



Of a total of 227 exhibits, 77 are of special interest to welding men. In order to make it easy to locate these exhibits, the respective booth spaces have been cross-hatched. Floor plan furnished by American Society for Metals, Cleveland, Ohio.

Handy & Harman, New York, N. Y. (Booth E107)

EXHIBITING: Will operate a production job in booth. Refrigerator valve parts will be brazed with Easy-Flo brazing alloy and Handy Flux at high speed and low cost. Sil-Fos, Easy-Flo and Handy Flux will be described on an illuminated background and also by samples of work on a variety of metals. A brazing station will be operated, demonstrating how their alloys work on various metals. A display case will show silver and alloys in other forms used for industrial purposes.

Hardy, Charles, Inc., New York, N. Y. (Booth B108)

EXHIBITING (in operation): Metal powders and alloy powders. Products fabricated from metal powders including bearings, friction clutches, magnets, tool steels, stainless steels, gears. Hardy-Lepel high frequency furnace lately developed for the sintering of metal powder products. This is the first time that such equipment has been demonstrated for powder metallurgical applications.

Harnischfeger Corp., Milwaukee, Wis. (Booth B122)

EXHIBITING: Will feature welding machines, welding electrodes, and electric hoists. This will present the first public demonstration of an entirely new electric arc welder—P&H Hansen Model 200-A, which is of simple, compact, square frame construction with but two major parts, and as a unit requires less than 3½ sq. ft. of floor space. One of the features of this new machine is the parallel hook up of two or more units, controlled by a multiple-shifter for single or multiple operation. Welding demonstrations will cover the various types of P&H Smootharc welding electrodes. There will also be on display operating units of P&H hoist equipment.

Haynes-Stellite Co., Kokomo, Ind. (Booths L302, M301 and L305)

EXHIBITING: In the Haynes Stellite Co. exhibit there will be a life-size working model of a giant valve used on high-temperature, high-pressure steam installations, demonstrating the various uses of hard-facing materials and corrosion-resisting alloys in such an installation. Also on display will be Haynes Stellite hard-facing rods and materials, and metal-cutting tools.

Hobart Brothers Co., Troy, Ohio. (Booth J301)

EXHIBITING: A complete new line of improved "Multi-Range" arc welders will be shown, including electric drive, gasoline engine drive and "build-your-own" generators. The new "Transarc" a-c. arc welder for single-phase power lines, will be included. Expert operators will be on hand to answer questions and demonstrate the weldability of various metals using latest type of electrodes.

Hollup Corp., Chicago, Ill. (Booth N331)

EXHIBITING: Will exhibit in conjunction with Compressed Industrial Gases, Inc., and exhibit will consist of their products of oxygen, acetylene, hydrogen, gas cutting apparatus, Victor equipment, etc. Hollup Corp. will exhibit welding machines, electrodes, welding equipment and supplies.

Illinois Testing Labs. Inc., Chicago, Ill. (Booth I210)

Independent Pneumatic Tool Co., Chicago, Ill. (Booth M326)

EXHIBITING (in operation): Thor portable electric drills, screw drivers, nut setters, hammers, sanders, polishers, grinders, saws, and tappers.

Ingersoll Steel & Disc Co., New Castle, Ind. (Booth J307)

International Nickel Co. Inc., New York, N. Y. (Booth C125)

EXHIBITING: Exhibit will consist of specimens of the following nickel-containing corrosion-resisting alloys: Monel, Nickel, Inconel, "Z" Nickel, Nickel Silver, Cupro-nickel, High nickel-chromium alloys, Nickel-molybdenum-iron alloys, Nickel-chromium-copper aluminum alloys, and Ni-Resist. Members of the Development and Research Division, Nickel Sales Department, and Monel and Rolled Nickel Department will be in attendance at the booth to discuss problems involving the application of nickel alloys.

Jones & Laughlin Steel Corp., Pittsburgh, Pa. (Booth B117)

EXHIBITING: Some phases of the operation of its Bessemer flame control, for scientific regulation of the Bessemer steel making process, will be demonstrated for the first time by Jones & Laughlin Steel Corp. This J & L invention will be explained by showing the Bessemer flame, as seen by the human eye, through use of natural color transparent photographs, illuminated progressively in conjunction with a large graph which traces the flame as seen and recorded by the photo-electric cells and control instruments.

Also of interest will be a scale replica of the J & L pilot plant laboratory, with models of its experimental open-hearth furnace, rolling mills and other steel making and finishing equipment. The machine shops, physical testing, metallographic, and chemical laboratories are also shown.

Kellogg Co., M. W., New York, N. Y. (Booth L306)

Krembs & Co., Chicago, Ill. (Booth A105)

Krouse Fatigue Testing Mach. Co., Columbus, Ohio. (Booth J310)

EXHIBITING (in operation): High speed, large rotating beam fatigue machines with wire testing adapters. High speed, small rotating beam fatigue machines with wire testing adapters. Sheet and plate fatigue machines, with corrosion fatigue attachments. High temperature fatigue machines.

Linde Air Products Co., New York, N. Y. (Booths L302, M301 and L305)

EXHIBITING: An extensive display of various types of stationary, semi-portable, and portable oxy-acetylene cutting machines will be a feature of this exhibit, accompanied by informative data on the operating and mechanical features of the machine and the various applications and shop conditions for which each machine is best suited. Other features at the Linde exhibit will be sections devoted to "Unionmelt" welding, the electric welding process developed by Linde in recent years, and to oxy-acetylene flame-hardening. The exhibit will also contain displays of Oxweld, Purox and Prest-O-Weld welding and cutting equipment, and Prest-O-Lite air-acetylene apparatus.

Lincoln Electric Co., The, Cleveland, Ohio. (Booth H205)

EXHIBITING: Latest developments in arc welding will feature exhibit of The Lincoln Electric Co. New Lincoln products which broaden the application of welding include new and improved arc welding generators and a number of new arc welding electrodes. Among new Lincoln welders will be a 200-amp. vertical machine, a 200-amp. special belted unit, a handy-sized 150-amp. machine and a special gasoline engine-driven welder.

New Lincoln electrodes include: "Fleetweld 10" electrode which provides full slag coverage and smoothness for finish beads; "Stainless C," a modification of the well known 18-8 analysis—18-8 SMO—suitable for welding stainless steels of types 316-317 (Iron and Steel Institute); "Inconweld" for arc welding non-tarnishing alloys of 80% nickel, 14% chromium and 6% iron such as Inconel; "Readyweld," for use with a-c. transformer type welders of low open-circuit voltage; "Hardweld 50," for building up steel parts and surfaces to resist deformation and wear; "Surfaceweld," a fine-grained alloyed powder, for providing a smooth, dense abrasion-resisting surface, to be applied with carbon arc.

Will demonstrate arc welding of various ferrous and non-ferrous metals. Welding of light gauge tubing at high speed by the "Electronic Tornado" process of automatic carbon arc welding will also be shown.

Machinery & Welder Corp., St. Louis, Mo. (Booth A108)

EXHIBITING: Will exhibit a 1000-lb. cap. Ransome welding positioner, Ruemelin fume collector, and complete line of Jackson electrode holders and safety equipment. Ransome tables are available in 600 lb., 1000 lb., 2000 lb., and 13,000 lb. capacities and can be hand or electrically operated. Ruemelin equipment comprises a complete line of portable and stationary collectors for most types of welding booths. Jackson's line will be shown complete with insulated electrode holders of all sizes, plain holders and various types of eye shields.

Magnaflux Corp., New York, N. Y. (Booth C119)

EXHIBITING (in operation): Magnaflux method of inspection, which is a nondestructive and rapid method for determining defects in steel and steel parts, will be demonstrated on the latest designed Magnaflux units as employed in the automotive, aircraft, railroad and welding industries as well as in all general

industrial fields. Various specimens from all of these industries will be exhibited.

Magnetic Analysis Corp., Long Island, N. Y. (Booth J314)

EXHIBITING (in operation): A magnetic analysis equipment for the inspection of steel for mechanical, physical, and chemical properties. A demagnetizing equipment for the demagnetization of ferrous material.

Manganese Steel Forge Co., Philadelphia, Pa. (Booth N329)

EXHIBITING: Will exhibit and demonstrate the extreme abrasive and wear resistant qualities of Rol-Man True 11-14% manganese steel in rolled, pressed, and forged shapes as well as the new type Rol-Man Weld-lock screens for sizing and separation of abrasive material.

The exhibit contains specifications of pins, bushings, bolts, forgings, wear plates, Rol-Man welding rods, and welded products. Also samples of used parts illustrating the abrasive wear resisting characteristics of Rol-Man manganese steel.

Mallory & Co., Inc., P. R., Indianapolis, Ind. (Booth K320)

EXHIBITING: All Mallory non-ferrous alloys for resistance welding electrodes, springs, bearings, bushings and current carrying members of electrical apparatus. Spot welding tips, seam welding wheels, flash and projection welding dies, water-cooled holders and dressers. Mallory electrical contacts of tungsten, silver, molybdenum and special alloys for every application. Circuit breakers and other customers' products showing contact applications.

Maurath, Inc., Cleveland, Ohio. (Booth B123)

McKay Co., Pittsburgh, Pa. (Booth A129)

EXHIBITING: Will have a welding booth and three welding machines demonstrating high voltage and low voltage A-C. welding as well as D-C. welding. A complete line of mild steel and stainless steel electrodes will be demonstrated on all types of joints.

Metal & Thermit Corp., New York, N. Y. (Booth D129)

EXHIBITING (in operation): The complete line of Murex electrodes for electric arc welding will be displayed, as well as examples of products made by electric welding. Demonstrations of arc welding will be given. Equipment for welding by the Thermit process will be shown together with typical repairs made by Thermit welding. In addition, samples of various metals and alloys produced by alumino-thermic reduction will be exhibited.

Metallizing Co. of America, Inc., Chicago, Ill. (Booth N302)

Molybdenum Corp. of America, Pittsburgh, Pa. (Booth H211)

EXHIBITING: Chemicals of molybdenum, tungsten and boron. Molybdenum and tungsten metal powders. Molybdenum oxide in metal containers. (The new way to add molybdenum to steel.)

National Cylinder Gas Co., Chicago, Ill. (Booth A126)

EXHIBITING (in operation): National's new No. 5 portable cutting machine will demonstrate bevel cutting of circles. It embodies many new features such as: light weight insulated construction, proper lubrication, rugged track, and nonreversing motor. A medium size National shape cutting machine will demonstrate shape cutting. Reduces shape cutting costs to a minimum. "Flame Hardening" properly executed—eliminating the human element—resulting in identical accurate results. "Torchweld" non-flash welding and cutting torches and regulators; each properly designed to do a certain type of welding or cutting, or supply a known volume of gas.

Olsen Testing Machine Co., Tinius, Philadelphia, Pa. (Booth J325)

Republic Steel Corp., Cleveland, Ohio. (Booth C131)

Resistance Welders Mfgrs. Assoc., Warren, Ohio. (Booth A137)

EXHIBITING: Photograph boards showing representative resistance welding machines as designed and built by the various member companies. Also on display will be a number of sample boards illustrating representative and typical resistance welding applications.

Rustless Iron & Steel Corp., Baltimore, Md. (Booth G210)

EXHIBITING (in operation): Rustless stainless steel bars, wire and products fabricated from them. A feature will be a presentation of original data and methods for the machining of stainless steel an actual demonstration of tools, parts and equipment.

Ryerson & Son, Inc., Joseph T., Chicago, Ill. (Booth N313)

EXHIBITING: Ryerson booth will feature a new alloy steel development.

Taylor Winfield Corp., Warren, Ohio. (Booth A137)

Una Welding, Inc., Cleveland, Ohio. (Booth B111)

EXHIBITING (in operation): Una full automatic electric welding heads for light coated and shielded arc welding. Una Goodspeed semi-automatic air head for welding with light coated wire. Complete line of forty different mild and alloy steel manual welding electrodes. Sample welds showing manual and automatic applications.

Union Carbide Co., New York, N. Y. (Booths L302, M301 and L305)

EXHIBITING: Refer to the exhibits of the following "Carbide" subsidiaries: Linde Air Products Co., Haynes Stellite Co., and Electro-Metallurgical Co.

United States Steel Corp., Pittsburgh, Pa. (Booth G205)

EXHIBITING: The central feature of the United States Steel Corp. subsidiaries exhibit will be in a series of dioramas, photo-murals and product displays featuring the progress in equipment and methods which has made it possible for steel users to secure the steel best suited to their needs and to get this same steel time after time as they may need it. This story will be told by animated models, a modern mill man taking an old-timer around the exhibit. They will discuss the outstanding advances in equipment, methods of manufacture, and closeness of control now available and what these mean to the steel user.

Representatives will be on hand at all times and ample seating space for visitors will be provided in attractive and restful surroundings. Cooperating in the Metal Show exhibit will be American Steel & Wire Co., Carnegie-Illinois Steel Corp., Columbia Steel Co., Cyclone Fence Co., National Tube Co., Scully Steel Products Co., and Tennessee Coal, Iron & Coal Railroad Co.

Wall Colmonoy Corp., Detroit, Mich. (Booth M327)

Welding Engineer, The, Chicago, Ill. (Booth A103)

EXHIBITING: Copies of the current issue of THE WELDING ENGINEER and of the Ninth Edition of the Welding Encyclopedia. Charts will graphically portray the upward trend in the welding and cutting market.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. (Booth B125)

EXHIBITING: A new electric furnace in actual operation for bright-hardening tool steel will be featured in the Westinghouse exhibit. The new electric furnace employs an atmosphere known as Ammogas. The Ammogas is so inactive with carbon that a soft skin does not form on 1.5 per cent steel soaked in it at 1850 deg. F. for an hour. So hardened, a tool or die has a bright clean surface as hard as the underlying metal.

A demonstration of phos-copper brazing by electric arc, welder controls, a-c. transformer-type, and motor-generator set welders (all in operation), will be in the exhibit.

Wilson Mechanical Instrument Co., New York, N. Y. (Booth H207)

EXHIBITING (in operation): "Rockwell" hardness tester. "Rockwell" superficial hardness tester. "Rockwell" motorized hardness tester. Special "Rockwell" testers for internal testing. Work support accessories for "Rockwell" hardness tester.

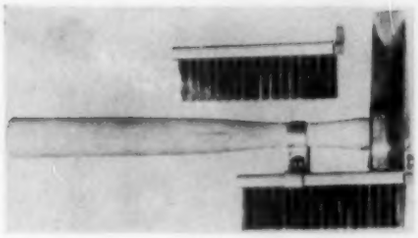
Wilson Welder & Metals Co., North Bergen, N. J. (Booth M319)

EXHIBITING: Will exhibit and demonstrate its complete new line of arc welding machines. The Wilson "Hornet"—"The Machine That Strings High Welding Costs," will be featured. This new Wilson arc welder requires only one control device, yet permits operators to obtain an infinite number of current settings.

Wire Association (Booth D120)

EXHIBITING: Copies of "Wire & Wire Products" and directory for advertising managers.

New Product Developments



Combination chipping hammer and wire brush.

Chipping Hammer and Wire Brush

★ A new convenience tool for welding departments is the Triplex Welders' Chipper, manufactured by St. Pierre Chain Corp., Worcester, Mass. It consists of a drop-forged steel chipping hammer with hardwood handle, having a heavy-duty wire brush rigidly mounted on the top side. The hammer chisel chips and breaks the scale, then the tool is turned in the hand and the brush is used to clean the surface. The wire brush is held in place by bolts which can be loosened to reverse the brush and thus get full wear from it, or to remove it and insert a new brush. The chipper was designed especially for the quick and thorough removal of slag formed on top of weld metal, when heavily-coated electrodes are used, but it is equally useful for removing rust and scale.

» «

Majestic A-C. Arc Welders

★ Two sizes of a-c. transformer type welders have been placed on the market by Majestic Welder Mfg. Co., 2 East 27th St., Minneapolis, Minn. The 200-amp. model is guaranteed to handle continuous welding with 5/32 in. electrodes. A similar guarantee for 3/16 in. electrodes is offerd with the 300-amp. model.

Majestic a-c. arc welder.

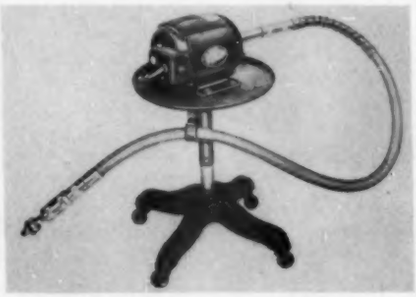
To insure longer life, the transformers are insulated with mica, asbestos and glass. Because of the efficiency of this insulating material, welders can be used continuously without danger of burn-out.

Another feature is the convenient heat adjustment control placed on top of the cabinet. This handy, readily visible heat control can be regulated to increase or decrease the welding current. Approved by Underwriters' Laboratories.

» «

New Line of Flexible-Shaft Tools

★ A new, low-priced line of flexible-shaft tools, for grinding, polishing, buffing, rubbing, wire brushing, sanding, filing and drilling operations, has been introduced by Stow Manufacturing Co., Inc., Binghamton, N. Y. The new line, to be known as the Stow Junior, has been designed to furnish companion units to the long-established Stow heavy-duty tools.



Pedestal type of Stow Junior flexible shaft tool for grinding and polishing.

First of the Stow Juniors to be put on the market is the pedestal type. It incorporates motor, extension cord and plug, flexible shaft and clamp spindle. Connection can be made with any light socket. Mounted on a 4-leg metal base with ball-bearing casters.

Motors of either ¼, ⅓ or ½ hp. can be had, with two choices of speeds—1725 or 3450 r.p.m. The ¼ hp. tool has a 3/16-in. flexible shaft 5 ft. long. Its maximum wheel capacity is 4 in. x 1 in. and maximum drilling capacity is ¼ in. The ⅓ and ½-hp. tools have a ½ in. x 6 ft. shaft, a maximum wheel capacity of 6 in. x 1 in. and a maximum drilling capacity of ⅜ in.

» «

Amsco "Dieweld" Welding Rod

★ The American Manganese Steel Division of The American Brake Shoe & Foundry Co. has a new rod in its line of welding rods, flux, filler bars and dipper tooth repointers. The new product is known as Amsco "Dieweld."

Amsco "Dieweld," as the name implies, is intended for reconditioning forging dies, hot and cold trimmers, shear knives, punches, cutting tools, etc. It is applicable to all ferrous base metals and can be deposited with freedom of porosity by the A-C. or D-C. arc welding method, as well as by the oxy-acetylene or atomic hydrogen process.

Amsco "Dieweld" rods are for building up worn dies, knives, punches and cutting tools.

On an upset forging operation, in a large forging plant, an average of 18,000 to 20,000 forgings were obtained from an original die installation. After reconditioning with Amsco "Dieweld," these same dies produced 29,800 forgings and showed no greater amount of wear than had previously occurred while producing 19,000 forgings, it is claimed.

Amsco "Dieweld" is air-hardening as welded and must be finished by grinding. For machining, it must be annealed and rehardened after machining. It has an average Rockwell hardness of between 55 and 60, either as welded or heat-treated. This rod is available in 3/32, ⅛, 5/32 and 3/16 in. diameters, either bare or coated.

Requests for samples and literature should be sent direct to the manufacturer.

» «

Lincoln Introduces "Hardweld 50"—A Medium-Carbon Steel Electrode

★ "Hardweld 50" is a medium-carbon steel electrode designed for building up of steel parts and surfaces. The deposit has considerable resistance to deformation and wear and is machineable at slow speed. The dipped coating stabilizes the arc and permits deposition of a tough dense medium-carbon steel.

In general, when deposited on straight carbon steel and allowed to cool naturally, the hardness of the deposit will be approximately 20-35 Rockwell C. The exact hardness will depend somewhat on the rate of cooling and the analysis of the steel on which it is deposited. Deposit may be hardened by the usual water quench from above approximately 1500 deg. F.—or by flame-hardening methods.

Can be used for surfaces which require more resistance to deformation, and wear than low carbon steel, but must still be machineable, such as: Shafts, axles, collars, flanges, locomotive and tractor parts, agricultural implements, vise jaws, etc. Also used extensively for building worn parts up to size before applying harder alloys.

WELDING PROCEDURE—Electrode positive, work negative. Deposit wide or narrow beads as desired. It is good practice to brush each bead with a wire brush before depositing another on top of it. "Hardweld 50" can be used for vertical welding but for best results, work should be fairly horizontal. Where vertical welding is required, start at bottom and weld up. Available in 3/16 in. and ¼ in. For any further information, write to Lincoln Electric Co., Cleveland, Ohio.

» «

Hobart Develops "Transarc"— A New A-C. Arc Welder

★ Hobart Brothers Co., Troy, Ohio, announces a new A-C. arc welder featuring ease of handling and exceptionally high efficiency of operation. The new welder has a range of 20 to 200 amp. and is for use on 220-volt single-phase power lines.

Outstanding features listed for this new a-c. "Transarc" include: (1) Safe operation—no electrical or mechanical connections between power lines and welding leads; (2) Efficiency—extremely high—95% as measured by KW input; (3) Stable arc—because of special inbuilt construction the striking or arc holding voltage increases as welding rate is reduced, making the arc easy to hold under all conditions; (4) Operating cost—current is consumed only when actual welding is being done. Special steel core keeps no-load losses at minimum, which also increases full-load efficiency; (5) Amply designed—welding current adjusted in large number of steps. Current desired for any job is available instantly, making welding easy on both light and heavy work.

The complete unit is mounted on hard rubber, ball-bearing casters. Hand grips are provided on each side for lifting. For current control—there is a large ring, with an inner switch to adjust to any special arc condition, or for intermediate steps between the outer ranges. The combination of the two provides 30 steps of adjustment. Inner control can be used to disconnect welder from power line, without pulling power plug or shutting off regular line switch. Size—32 in. x 18 in. wide x 14½ in. deep. Weight approximately 210 lbs. Equipment comes complete with electrode and ground cables, electrode holder and ground plate, head shield, wire brush, assortment of Hobart electrodes, and power cable and plug. An attractive two-color circular is available describing this unit in complete detail and will be furnished to anyone interested by writing direct to Hobart Brothers Co., Box TA-69, Troy, Ohio.

Hobart's new "Transarc" a-c. welder.

» «

Latest type of Gasfluxer for brazing operations.

Improved Type of "Gasfluxer"

★ The line of liquid Gasfluxes and Gasfluxers, made by The Automatic Gasflux Co., 700 Public Square Bldg., Cleveland, Ohio, has been augmented by a new line of improved all-metal fluxers of various sizes and by a new liquid Gasflux.

Under the Gasflux process, the liquid flux is picked up by the gas in vapor form and delivered through the flame to the work. Some of the advantages claimed for this process in brazing and in non-ferrous welding are: (1) Places the flux in the flame where it is needed. (2) Produces stronger and cleaner and non-porous welds. (3) Eliminates necessity for pickling; and (4) Does away with dipping rod in flux.

The new all-metal Fluxers are made of cast aluminum, combining light-weight with strength, and are made in various sizes suitable for either large production jobs or for a small amount of job or maintenance work. One special feature of the new Fluxer is the graduated flux regulating valve, which makes it possible to vary the amount of flux used on different jobs. Operation of this device is quite simple, merely involving the turning of a small lever from one index to another to give a variable gas and flux mixture.

Gasflux is placed in the new unit through a filler cap in the head and may be removed through a drain plug on the side at the level of the bottom. Visual inspection of Gasflux level is provided through a small glass window on the front. Two simple connections make it possible to cut the fluxer into the gas line without difficulty.

The new Gasflux developed for use in the new type Fluxer, which uses a wick system of vaporization, is said to be of a superior quality and extremely volatile. Less Gasflux is needed for operation of equipment. A new flux has also been developed for welding stainless steel.

» «

Nemco Weld Filler

★ Northeast Metals Co., 4124 Torresdale Ave., Philadelphia, Pa., announces Nemco Weld Filler for sealing arc welds on cast-iron. It is claimed that when this product is applied over electric welds on cast-iron, the joint is capable of withstanding an internal pressure up to 70 lbs. per square inch. For example, an arc welded repair in a cast-iron cylinder jacket could withstand a water pressure up to 70 lbs. before failure of the joint. The manufacturer has descriptive literature and samples available.

» «

"Herculite" Welding Shields

★ A new one-piece ribbed construction is featured in the new Dockson Herculite welding shields, manufactured by C. H. Dockson Co., 3839 Wabash Ave., Detroit, Mich. This type of construction permits use of a medium weight fibre without sacrifice of strength or ruggedness. Attention is directed to the instantly changeable lens holder. The new Dockson shield thus provides extreme lightness with maximum comfort, convenience and economy.

Th new design is available in helmet type (No. 1550) for use where the operator requires freedom of both hands and the hand-shield type (No. 1525) for use in tacking operations, wherever freedom of one hand is not essential. In both types, the clear cover glass can be removed or replaced without removing the colored filter glass.

Dockson "Herculite" hand shield features one-piece ribbed construction.

New Meco "Cutmaster" cutting torch.

Meco "Cutmaster" Features New Design of Head Mixer

★ The new Meco "Cutmaster" oxy-acetylene cutting torch employs 3-tube construction using tubes of Monel metal for maximum heat resistance and structural strength. All other parts are of forged and extruded metals.

A patented head mixer is claimed to provide a perfect mixture of preheating gases and allows for easy cleaning to eliminate overheating. The connection of tip to head is also of patented construction and eliminates possibility of leakage between high-pressure passageways into preheating passage, as well as open leaks that might endanger the operator. Much longer tip life is claimed as a result of these two features which protect the tip from overheating.

The high-pressure oxygen valve is controlled by a long lever, mounted on top, and, because of the leverage the pressure required to operate the valve is negligible. A thumb-operated locking device is conveniently placed at the end of the control lever. An additional factor to minimize fatigue in prolonged operation of the torch is the balanced design.

Needle valves are equipped with Meco (patented) tension springs. These provide for automatic take-up against wear and assure accuracy of adjustment even if torch is accidently dropped. All other moving parts, as well as threaded connections and seats at the tip, are designed to permit adjustment to take up for normal wear without replacement. Manufactured by Modern Engineering Co., 3401 Pine Blvd., St. Louis, Mo.

» «

Bench Type Spot Welders

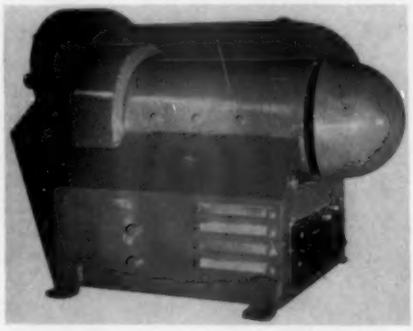
★ Several new models of bench type electric spot welders have been brought out by Eisler Engineering Co., 750 S. 13th St., Newark, N. J. They range in sizes ¼—½—1—2 and 3 kva. The body which supports the mechanical parts and the transformer is fabricated from sheet iron and is a complete self-contained unit.

These machines are made in two distinct models, as shown, namely, the plunger-press type and the conventional swinging-arm type. Many different combinations of electrode arrangements can be fitted into the electrode holders. Both types are arranged for 110 or 220 volts, and are made for 25, 40, 50 or 60 cycle, a-c. single phase.

For various thicknesses within range, heat requirements are regulated through a number of definite taps on the secondary. There are five secondary taps on each model.

Speed of welding machines depends entirely on nature of work and ranges anywhere from 25 to 150 spots per min. They can be employed for welding sheet metal and wire articles such as brass, bronze, iron, molybdenum, aluminum foil, etc.

» «



Lincoln "Shield-Arc Junior" 200-amp. arc welder for belt or direct drive.

Small Welder for Belt or Direct Drive

★ A new small arc welding machine, designed especially for use by garages, blacksmith shops, job welding shops, contractors, machine shops, etc., is announced by The Lincoln Electric Co. Cleveland, Ohio. This new mcahine makes it possible for such concerns to minimize first costs in equipping for arc welding.

The new welder known as the "Shield-Arc Junior," has been built for use in conjunction with an engine or electric motor drive. Direct coupled to a gasoline engine, or belted to a power take-off from an engine, or connected by belt to line shafting or to an electric motor, this welder generates a smooth current for a wide variety of arc welding applications. Typical suggested uses for this machine include: light-gauge metal such as automobile fenders; galvanized sheet; repair of cast-iron parts such as engine blocks; fabrication of angle iron and plate parts and structures; hard-facing of plow shares and other wearing parts; and repair of miscellaneous farm implements and machinery.

The "Shield-Arc Junior" is rated at 200 amp. and its current range, welding duty, 30-volt arc, is from 60 to 250 amp. The machine is 29⅝ in. long over pulley, 18 in. high with a base 15½ in. x 19⅝ in. Net weight is 320 lbs.

A feature of the "Shield-Arc Junior" is the system of voltage and current control. This system of control, known as dual-continuous control, permits independent adjustment of voltage and current, giving complete and separate control of arc heat and arc penetration for easy, speedy welding of any job. This type of control is stated to be essential for best quality welding and maximum welding economy in the varied applications in which the machine can be profitably used.

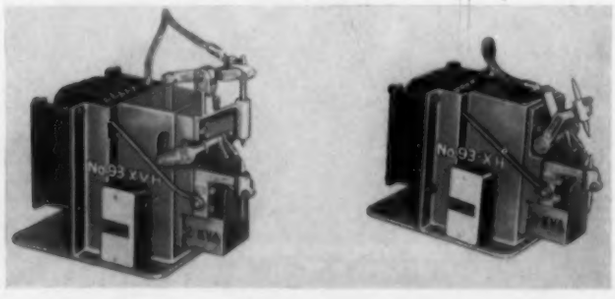
Equipped with Class B (non-inflammable) insulation, at the proper points, the "Shield-Arc Junior" can be operated with relatively large size electrodes at high average current without danger of burning out. The coils wound with asbestos-covered wire, are held in mica-lined slots, separated by mica dividers, and the leads are connected into the commutator by special, high-melting-point solder. End turns are insulated with mica tape.

The generator is single-operator, variable-voltage type with laminated pole pieces. The generator armature is mounted on a large shaft with pulley. Construction is arc welded steel, drip-proof. The welder is fitted with four steel feet welded to the base and drilled for bolting. Machine occupies a space less than 2 ft. square.

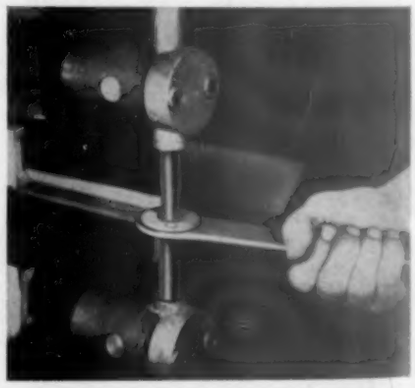
» «

New Spot Welding Tip Dresser

★ A new tool that re-machines both upper and lower spot welding tips to their correct profile "on the job," without necessitating removal of tips from their water-cooled holders, has just been introduced by P. R. Mallory & Co., Inc., Indianapolis, Ind. The new dresser saves considerable "down" time and insures use of uniform contact area with the work. The result is better and more uniform welds, less "time out" for re-dressing, and lower dressing costs. Field tests are said to prove that it is one of the most efficient tools of its type available.



Two types of bench mounted spot welders.



Simple tool for re-dressing electrode tips on the job.

National No. 5 in action on straight line cutting.

Streamlined Portable Flame-Cutting Machine—National No. 5

★ The National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, will introduce its new streamline No. 5 portable cutting machine at the forthcoming National Metals Exposition in Chicago. This new unit is a light weight, motor-driven, oxy-acetylene cutting machine designed to cut straight lines of any length with either a square or beveled edge. It also cuts circles ranging from 3 in. to 89 in. in diameter with square or beveled edge, and irregular outlines to a limited degree. Notable among its features are better balance, motor insulation and handier controls.

» «

Three Face Shields in One

★ A new type of face shield embodies complete interchangeability of parts. A screen, fibre or "plastacele" guard may be quickly buttoned on at the option of the wearer. When fitted with plastacele window, it is ideal for spot, flash and gun welding, buffing, polishing, wire brushing, die casting, etc. When fitted with wire screen window, it is recommended for use for babbitting, heat protection, etc. A fibre front and glass holder give the wearer complete protection for acetylene welding, cutting or scarfing.

The windows are buttoned on the spark deflector (fibre forehead guard). Absorbent leather sweat-bands, backed by wood felt, keep perspiration out of the eyes. Plastacele windows are aluminum bound to permit individual fitting. When not in use the window can be tilted upward to protect from overhead glare. The Boyer-Campbell Co., Detroit, Mich., is the manufacturer.

Illuminated Magnifier For Weld Inspection

★ The latest addition to the line of illuminated magnifiers made by E. W. Pike & Co., 1029 Newark Ave., Elizabeth, N. J., is the Pike-o-scope, which was originally developed for internal inspections, and for close examinations of parts not readily inspected by an ordinary magnifying glass, such as welds in tank and pressure vessel interiors, welded pipe installations, and structural work.

Illuminated magnifier for close examination of welded joints.

The unit consists of a set of achromatic triple lenses threaded into a Bakelite frame to permit proper focusing, and a special "Dalite" lamp in a moulded plastic cylinder, which also acts as a handle. To this is attached a cord and plugs for attachment to any electric light socket. The electric circuit connection is interchangeable with a flash-light case containing two dry cells for field inspections where no electric circuit is available. The lenses are available in either the 4½ or the 7 power magnification, the smaller magnification being preferred for weld inspection because of its wider field.

» «

Four New Page Welding Electrodes

★ Four new welding electrodes called Page "Surface - Saving Electrodes" have been added to the line manufactured by Page Steel and Wire Division of American Chain & Cable Co., Inc., Monessen, Pa. These electrodes are alloyed to meet the deman for tough abrasion-resisting materials for original surface maintenance and repair of metal parts subject to excessive wear.

Page "Surface-Saving Electrodes" all inter-alloy with the base metal when applied by the metallic arc method, thus forming a welded bond. Four different electrodes are available, each having physical and chemical characteristics suiting them for particular needs. A comprehensive booklet is available from the manufacturer.

» «

Eye Comfort Cushion Pad

★ A comfort cushion pad has been developed to alleviate the discomfort of wearing goggles on industrial operations such as preheating, metal pouring, relining open hearths and heavy gas welding. It is stated that these intense heats are conducted to the wearer's face through the eye cups of molded plastic goggles.

This comfort cushion pad alleviates the discomfort of wearing "eye-cup" goggles.

This new cushion pad, molded from soft sponge rubber fits over the eye cups of Cesco chipping and welding type goggles. The rubber pad insulates the plastic goggles from the wearer's face, preventing blisters and burns. When snapped over the eye cup, the elasticity of the rubber holds the pad securely in place without cementing or sewing. Pads can be sterilized and are readily replaced when necessary. The Chicago Eye Shield Co., 2300 Warren Blvd., Chicago, Ill., is the distributor.

» «

Safety Goggle Has Double-Braced Bridge

★ All of its Ful-Vue safety goggles, American Optical Co. announces, will shortly be supplied with a new, improved type of bridge nose-piece) and also in a new range of eye and bridge sizes (three of each). The new double-braced bridge, soldered at four places to the lens-frame instead of the conventional two permitted by ordinary bridges, is a sturdy design that should give long service under hard use. The added rigidity, resulting from longer bearing surface of the bridge on the lens-frame, means that the goggles will stay in proper adjustment longer, under

With new type of face shield the wearer can choose either a screen, fibre, or "plastacele" guard.

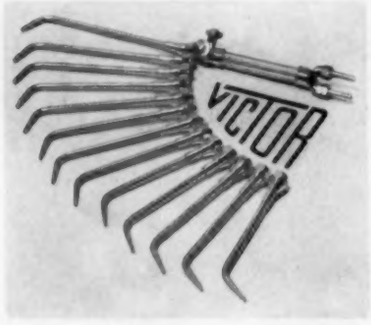
strenuous daily handling, and even under impact.

Modern styling and decorative milling of the bridge improve appearance of the goggles. To secure more exact fitting of goggles to individual workers, they will be supplied in 3 eye sizes (44, 47 and 50 mm.) and 3 bridge sizes (21, 23 and 25 mm. between lenses).

» «

Improved Aeroplane Torch

★ For accurate control of the lighter gauge metal welding operations encountered in the aeronautical, radio, refrigeration and sheet metal industries, including such operations as saw welding, Victor Equipment Co. of San Francisco now offer their new Model J-20 welding torch. Instead of the usual



Victor Model J-20 torch.

nozzle size graduations, the Model J-20 is provided with 13 nozzle sizes, covering drill sizes from No. 75 to No. 49. Each nozzle is provided with the patented Victor "spiral mixer and gas proportioner." Thumb valve control permits accurate flame adjustment while welding.

» «

Offset Water-Cooled Holder For Spot Welding Tips

★ Easily adjustable to all positions required to reach the most inaccessible spots, the new Universal Holder for spot welding tips, introduced by P. R. Mallory & Co., Inc., Indianapolis, Ind., should offer product design engineers a solution to many of their "headaches." The new holder is assembled entirely of standard parts and is available with either a 30 deg. or a 90 deg. tip socket. Another important feature is a tip knockout device which eliminates difficulties often encountered in removing replaceable tapered-shank tips.

» «

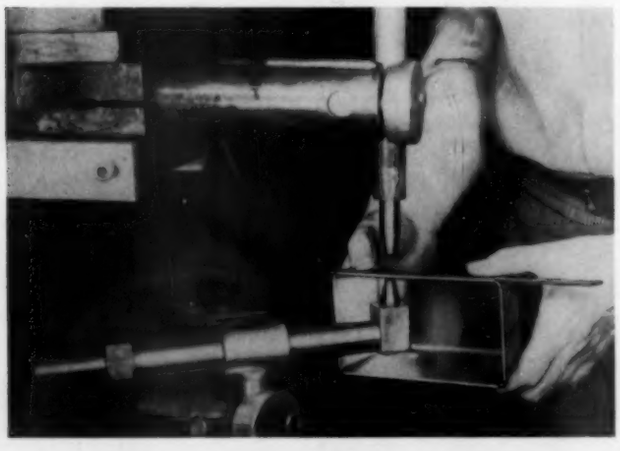
Improved Type of Welder's Glove

★ The Industrial Gloves Co., 750 Garfield Blvd., Danville, Ill., has recently added a one-piece back welders' glove to its line of industrial safety clothing. The new glove, Safeguard No. 13475, embodies several features designed to give the wearer greatest efficiency and long service.

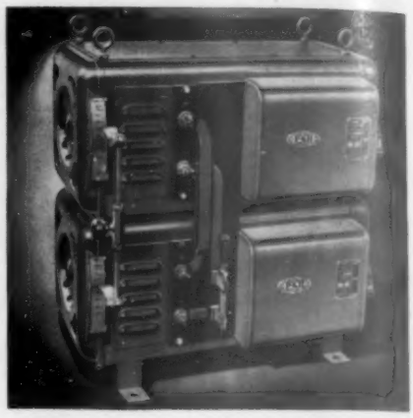
Back of the glove is made from one solid piece of leather, eliminating burning out of seams. An extra wide leather strap protects and reinforces the thumb seam, and all other seams at points of greatest wear are welded for extra reinforcement. A wool heat-breaker is securely sewed to the back of the glove, inside, to provide insulation against heat.

The entire glove is manufactured from shrink-proof heat-resistant leather, which will remain soft and flexible under severe temperature conditions, it is claimed.

This glove has one-piece back and woolen "heat-breaker."



This universal holder for spot welding tips simplifies production problems.



Two P. & H.-Hansen WA-200 machines can be hooked up to operate in parallel.

New 200-Amp. Welder Can Be Hooked Up in Parallel

★ Parallel hook-ups of welding generators are stated to be beneficial in plants where welding jobs requiring large amperages are frequently met, but where the run-of-the mill is one calling for welding heats up to 225 amp. Thus it is not necessary to incur the expense of a large welder which may only be used infrequently. It is pointed out that with two or more P & H Hansen WA-200's the user always has the extra capacity needed. When two such units are mounted in parallel, the installation provides two 225-amp. welding services, or one 450-amp. service.

Thus installed, they may be used singly or in parallel, connected or disconnected at will, by means of a paralleling switch mounted on the unit at the bottom. This paralleling switch is easily installed. When used in parallel the two units are controlled automatically as one unit by the ingenious "Multiple Shifter." This device makes possible a continuance of the single-current control, whereby, the open circuit and arc voltage are automatically regulated for proper welding heat.

Owing to the compact, square design of the WA-200, these units can be stacked one above the other for parallel hookups without need for any structural framework or other support. Also, when mounted in parallel in this manner, the units require but 3½ sq. ft. of floor space. When using two units in parallel, the operator sets the indicator at exactly ½ the current desired. For example, a 300 amp. capacity is provided by setting the "Multiple Shifter" at 150 amp. If three machines are hooked in parallel, the indicator would be set at 100 or 1/3 of the total current desired. Where production calls for two machines individually operated, it is a simple task to open the paralleling switch to permit separate operation of each unit.

For further information on these new machines write to the manufacturer, Harnischfeger Corp., 4400 W. National Ave., Milwaukee, Wis.

» «

Manly E. Lord has been appointed manager of the Ft. Wayne, Ind., works of General Electric Co. He succeeds Neil Currie, Jr., who has become assistant to the vice president in charge of manufacturing with headquarters at Schenectady, N. Y.

Fig. 1—A welded herringbone gear blank. Hub was forged from a billet and rim was rolled in two pieces.

Taylor-Winfield's fabricating plant specializes in

Welded Machine Frames

★ Proper routing of work and suitable work-handling fixtures are important in reducing cost of welded fabrication and speeding deliveries to customers

By T. W. ALLEN

Manager, Fabricating Division, The Taylor-Winfield Corp., Detroit, Mich.

BECAUSE OF THE rapid growth of welded plate fabricators, most of us have failed to point out, to those whom we serve, our exact position and the many advantages we have to offer. We have taken the attitude that every one knows of our accomplishments. I do not believe that such should be the case, as hardly a day passes but that some of our customers call or visit our plant to learn at first hand how we do the things which they see only in the finished product. We are constantly being called in to advise ways and means to fabricate intricate machine bases in order to save time and reduce costs. We feel that this situation presents a challenge to our industry and now is the time to accept this challenge.

Due to the high productivity of our large industrial plants, machine tool builders are compelled to build special machinery with a greater output per hour than ever before and each application seems to demand a special machine. Furthermore, change-over periods have been shortened to eliminate, as far as possible, layoff periods. This, in turn, forces the machinery builder to reduce his delivery time far below what it was several years ago. We know, personally, of many instances where machinery builders have been allowed only four weeks to deliver special machinery. There are some cases where this time has been cut to three weeks.

The question arises "How is it possible to accomplish such deliveries?" There are a good many reasons, but the one that the writer feels is of great importance is the role assumed by the welded plate fabricator. It is in this field that our company has devoted most of its time and effort. Our location in Detroit, Mich., further lends itself to this class of work.

First of all, I want to point out that in a good many cases, the tool builder would not be able to secure the finished

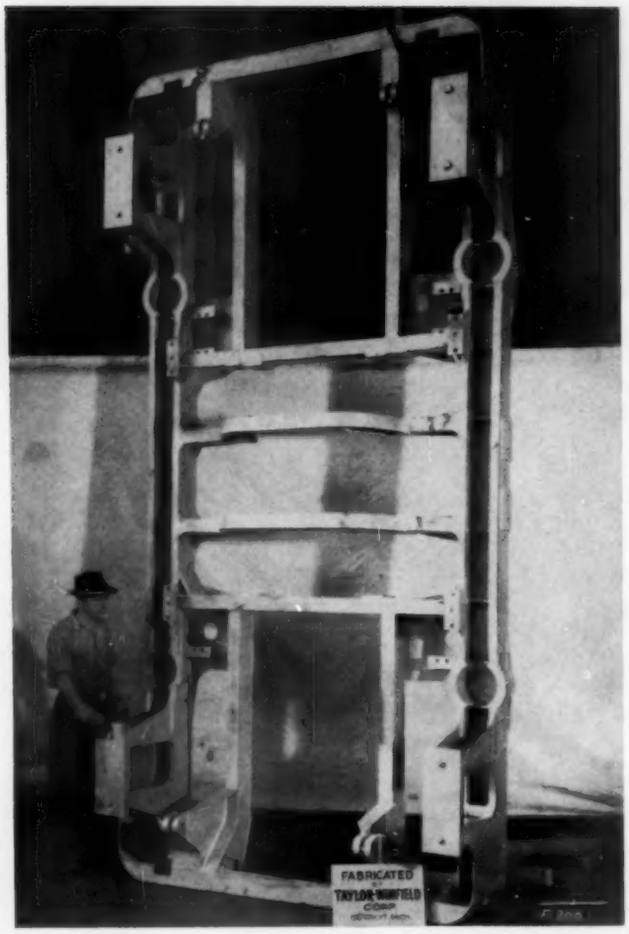


Fig. 2—Special welded car frame made from Cromansil alloy steel. Customer achieved reduced weight and increased strength. Frame was completely machined before shipping.

pattern within the time allowed for delivery of the completed machine, if it were necessary to furnish a cast-iron frame. This emphasizes the real possibilities in welded plate fabrication.

Upon receipt of the order and the customer's blueprint, it is immediately turned over to our engineering department. They in turn make detail drawings, templates for flame cutting, forming layouts and a bill of material.

Engineering Control

On the detail drawings, the engineering department specifies the sizes of chamfers and welds for all seams and joints. This procedure provides complete control of the fabricating operations and proper welding. If the shop has a suggested change to make, it is taken up with the engineering department and, if it is accepted, changes are made on all drawings and detail sheets for future reference of repeat orders.

Summing up the above in a few words, all engineering is done only in our engineering department. This procedure places the design and production responsibility on one department. We have found that this method has reduced our time considerably in the handling of customers' orders.

When the shop receives the order, it is only necessary to prepare the material and proceed immediately with the fabrication. Our shop is so arranged that as the material is prepared, assembled, and welded it advances through the shop from one end to the other.

The steel plate is stored at the rear end of the building. Opposite the steel plate, are located two large flame-cutting machines and, next in line, are two large shears. Opposite the shears and adjacent to the flame-cutting machines, a special chamfering machine is located. In this same area, a large iron worker, a metal saw, and a bar stock rack are located. As we proceed through the shop, we find three forming brakes, over which we have mounted jib cranes with air-operated hoists to facilitate handling of material in and out of the machines. The pyramid rolls are next in line after the brakes.

The above mentioned equipment comprise the greater part of our equipment necessary to prepare all of the material before assembling and welding. This equipment occupies approximately half of the length of our shop, in the order mentioned. We maintain an aisle through the center of the shop from one end to the other, which is kept open at all times.

Fig. 3—Welded frame for special production grinding machine. Note plate forming work required.

The remaining half of our shop is divided into two sections for assembly and welding. On one side of the aisle, we assemble all of our bases, etc., on machined surface set-up tables, which permit accurate work and close tolerances. One the other side of the aisle, behind large canvas curtains, all of our welding is done. Each welder has a jib crane with an air-operated hoist for positioning and other handling purposes.

After the welding is completed, the base is moved to the front end of the shop where all seams, corners, etc., are ground, prior to going to the oven for stress-relieving and sand-blasting. When the base is received from the oven, it returns to the front end of the

shop where additional cleaning and checking is done.

From this same location, finished work is shipped, ending the straight line follow-through method employed in our shop. This procedure eliminates back-tracking and confusion, and also prevents congestion at any point in the shop. This provides efficient handling and each operation can be followed or supervised very readily at all times.

Can Give Quick Delivery

Because of this efficient procedure, we are able to quote very short deliveries on our customers' requirements. We carry, at all times, an adequate supply of steel plate ranging in thickness from ⅛ in. to and including 8 in.

With such an equipped shop, we can handle diversified plate fabrication. As an illustration of this, we show a group of photographs of jobs we have fabricated, each different in size, weight, and material. Following are brief descriptions of each photograph:

Fig. 1. A large herringbone gear blank. Rim and hub are made from SAE 2320 steel. This steel has a nickel content of 3.75%. Hub was forged from a billet and the rim was rolled in two pieces. The two welded joints in the rim were shaped to conform to the herringbone teeth and were so located to permit a starting place for the special hobbing tool used to cut the teeth in the rim. Spokes were made from special wide-flange "H" beam sections. The finished blank weighed 20,000 lbs.

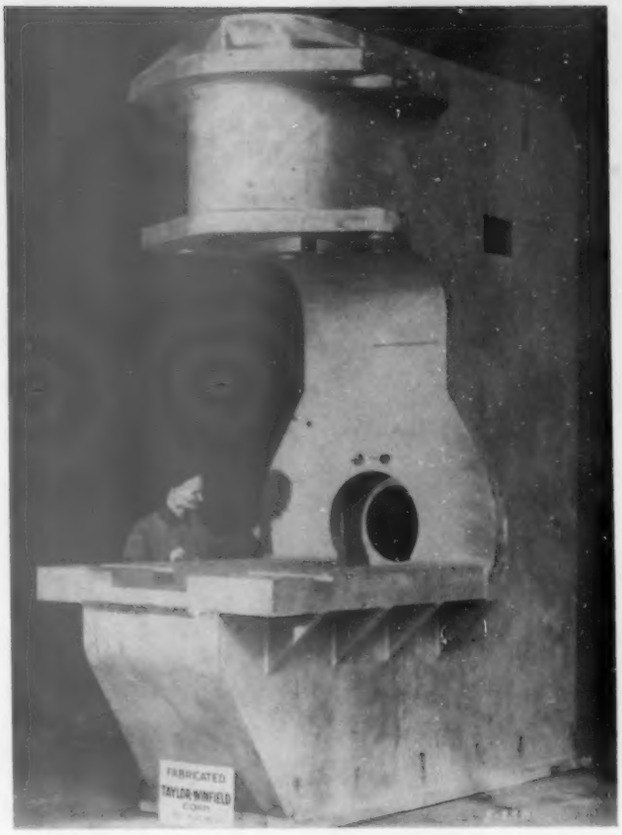


Fig. 5—Welded C frame for hydraulic joggling press. Plate thicknesses varied from 2 to 6 in. Lower platen was cut from 6 in. plate. Keyways were machined in plate.

Fig. 2. Special fabricated car frame made from Cromansil steel. This steel permitted customer to reduce the weight and increase the strength in the finished frame. This frame was also completely machined before shipping to customer. The overall length was 14 ft. and the width 7 ft. Shipping weight 4,000 lbs. It was quite a problem in the welding of this frame to avoid distortion.

Fig. 3. This unit, comprising three separate pieces; base, column and hopper, was built and completely machined for a manufacturer of production grinding machines in which rigidity is of prime importance for close grinding tolerances. Incidentally, this machine was awarded first prize for the outstanding machine of the month in a recent contest based on design and appearance of machines. Attention should be called to the forming work required.

Fig. 4. A good example of a production job handled in our shop. This picture shows five different sizes and styles of bases, all made from light gauge plate. All of the pieces used in the fabrication of these bases, with the exception of a few short pieces of standard bar stock, were made from rolled plate. This particular job required a number of forming and pressing operations. It was also necessary to provide a number of jigs for assembly and welding to hold to the close tolerances permitted. These bases are built in lots of 200 or more. Shipping weight averages 300 lbs. each.

Fig. 5. A large "C" type frame for a hydraulically operated joggling

(Continued on page 70)

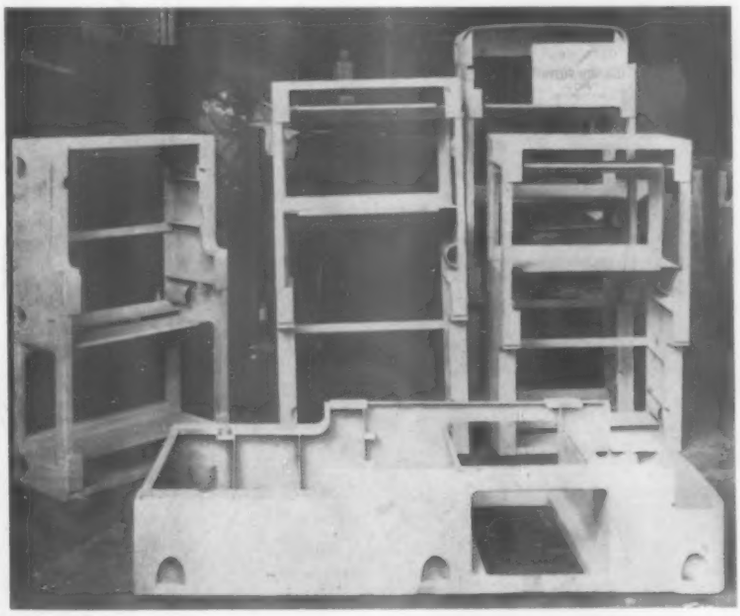


Fig. 4—Examples of production jobs fabricated almost entirely from rolled plate. Built in lots of 200 or more at a time.

Down on the farm!—Here is what streamlining has done to farm tractors. Farmall Model-A tractor with 1-row cultivator. Photo (International Harvester Co.).

Production economies made possible by resistance

Welding of Tractor Parts

★ Prominent tractor builder has effected sizeable economies through redesign of parts to permit replacement of castings and forgings with spot, butt, or projection-welded assemblies

THE ABILITY to utilize metals and alloys effectively and economically by distributing them throughout a structure in proper relation to their physical properties is an outstanding advantage of welded assembly. This important advantage of welding is well demonstrated by International Harvester Co.'s experience in tractor manufacture. As our readers are well aware, this company is a pioneer and at present the volume leader in farm tractor production. The pictorial story which follows is based upon information obtained by visiting the Harvester Company's Chicago tractor plant at 2600 W. 31st Blvd.

By means of resistance welding, particularly butt-flash and projection welding, the Harvester "Farmall" tractors are assembled as economically as modern production technique makes possible. There are several notable advantages emphasized in resistance welding applications as found at the Chicago plant. Probably the major advantage is that such welding makes possible the machining of small parts before assembly. This permits a tremendous reduction in machining costs, because the machine tool set-up is much less costly on small parts than it is on larger parts. Another important economy is achieved by welding machined parts after they have been hardened. An example is here illustrated of a steering worm shaft assembly, the worm being case hardened by carburizing and then ground before it is flash welded to the shaft. The end of the worm to be welded is kept soft by copper plating before it is placed in the carburizing bath.

Another important advantage of welded assembly is that it permits forged parts to be joined to hot-rolled or cold-rolled bars. This is considerably cheaper than using a forging for the entire part. In using projection welding the parts to be assembled need

ver little preparation before welding. Perfect alignment is obtained by means of copper-alloy holding and clamping fixtures on the welding machine. By using properly-designed projections it is possible to weld fender brackets, for example, without marring the surface finish. It is difficult to avoid surface indentations in spot welding thick sections, because of the tremendous pressure employed on the electrodes, while the metal is at a plastic temperature.

By using deep projections, it is possible to insert a gasket between two metallic parts and projection weld the

A tractor can't be a sissy!—A Model TD-18 TracTracTor pulling a large scraper on a road building project. Photo (International Harvester Co.).

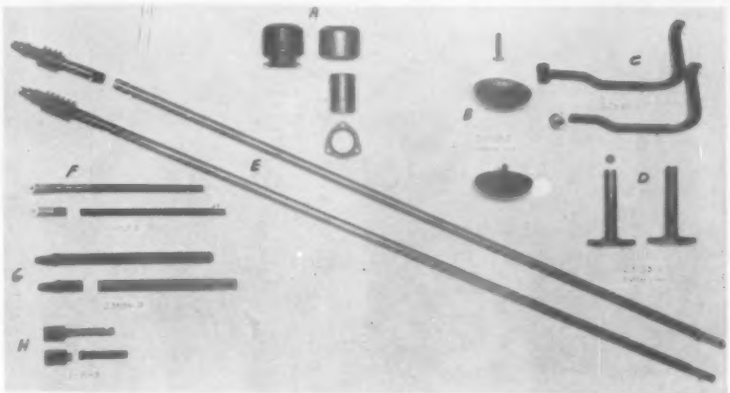


Fig. 1—(A) Air cleaner tube cap. Screen is rolled into the tube and spot welded with one end flanged so that it can be spot welded to the cap. (B) Radiator cap. A threaded stud, with rounded end, is projection welded to the cap. (C) Brake pedal. Bushing is flash welded to pedal. (D) Seat support. Forging is slotted and then a ⅛ in. slug is projection welded, using one projection on each side of slot. (E) Steering gear worm shaft assembly. The worm is given a carburizing heat treatment, then ground and flash welded to the long shaft. One end of worm is kept soft by copper plating before carburizing. (F) Steering clutch rod. Standard fork is flash welded to the threaded rod. (G) Hand brake lever assembly. Forging is flash welded to flat bar stock. (H) Brake cam. Flash welded.

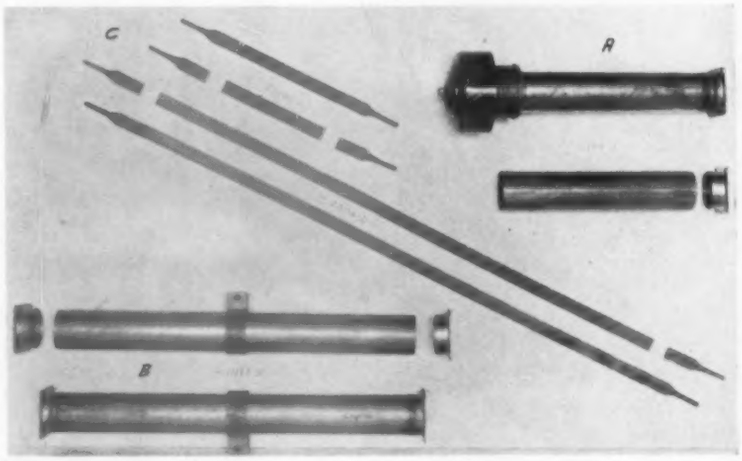


Fig. 2—(A) Air cleaner tube. (B) Flange is flash welded to tube 3 in. dia., 1/16 in. wall thickness. This was formerly a riveted job. (C) Fuel tank straps. Forging is flash welded to each end of .078 in. thick strap.

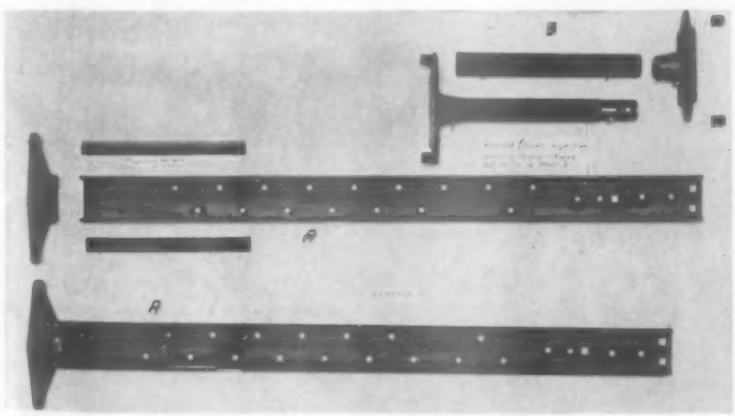


Fig. 3—(A) Wheel tractor side frame channels. The 5/16 in. by 1½ in. strip is projection welded to the inside of each leg of channel flush with end, using six projections, two at a time on 400-kva. machine. Forging is then flash welded to channel and strips on 350-kva. hydraulic flash welder. (B) Lower front bolster assembly of wheel tractor. Two ⅞-in. dia. round end stops are projection welded to forging. Forging is then flash welded to 2½-in. dia. shaft on 250-kva. hydraulic flash welder.

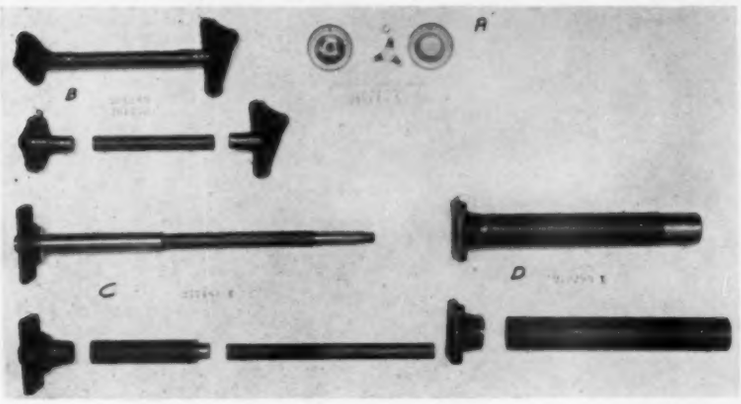


Fig. 4—(A) Radiator cap assembly. Cap, threaded bushing and gasket holder are all projection welded at once. End of bushing is rounded. (B) Bumper brace. Steel castings are flash welded to pipe. (C) Upper bolster. Forging and two pieces of bar stock are flash welded—hardened and ground after welding. (D) Diagonal brace. Forging is welded to seamless tubing ⅜-in. wall thickness.

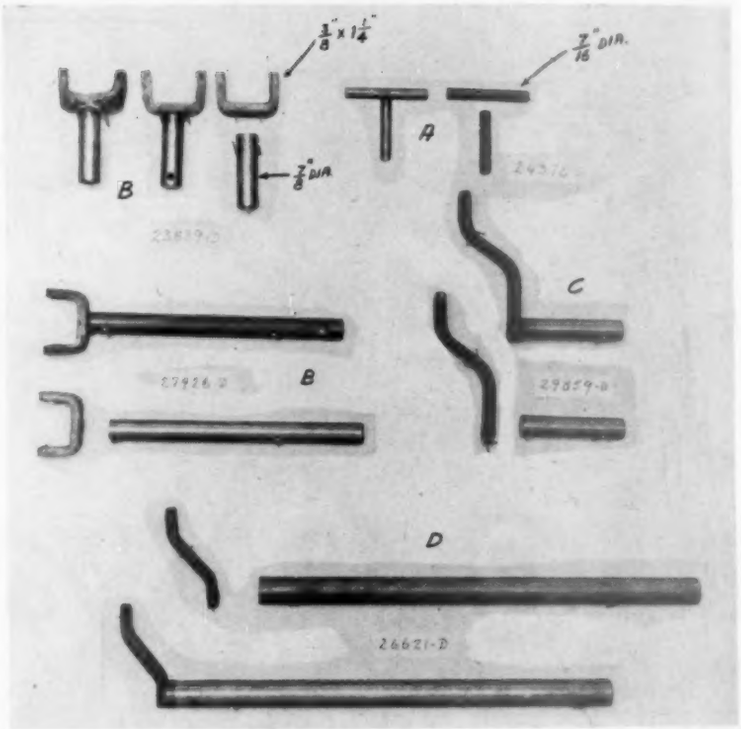


Fig. 5—(A) Tool box latch tee welded on projection welder (300 per hr.). (B) Starting crank universal joint assembly, using ⅝ in. dia. by 3/32 in. high projection, and welding to ⅞-in. dia. shaft. Clamping pressure 4500 lbs. on ⅞-in. shaft (200 per hr.). (C) Brake lever. Procedure same as in (B). (200 per hr.) (D) Clutch throw-out shaft and lever. Same as (B). Work done on 400-kva. projection welder. All shafts are of cold-rolled steel.

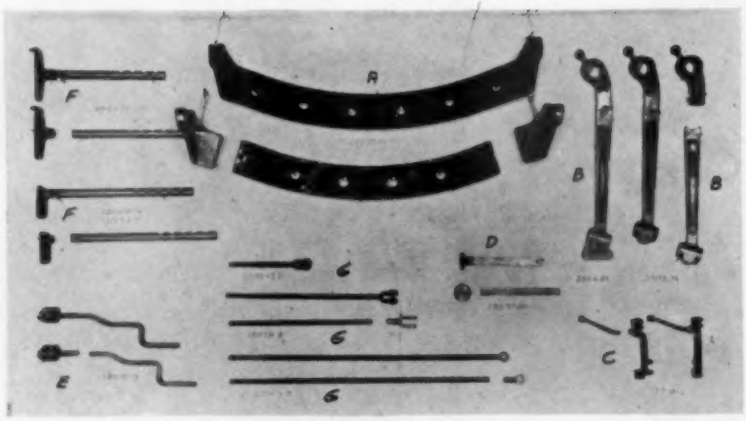


Fig. 6—(A) Draw-bar support. Two steel castings are flash welded to bent bar. (B) Steering brake levers. Two forgings are flash welded. Ball end is completely machined before welding. (C) Governor lever. Two forgings are flash welded. Couldn't be made in one forging. (D) Heat control rod. A ⅜ x ¾ in. bar is welded to 3/16 in. thick disc. No machining for weld. (E) Power take-off shifter lever. Forging is flash welded to formed bar. (F) Adjustable brake pedal foot pad assembly. Forging is welded to cold-rolled steel shaft, machined before welding. (G) Brake and steering clutch rods. Standard ends are flash welded to rods.

entire assembly. This principle is employed in welding tapping bars to the transmission cover. The gasket is necessary to make an oil-tight seal for the filler or inspection cap. Still another advantage of projection welding is noted in the fabrication of the tractor dash assembly. In this job an angle iron frame is projection welded to the dash board using a total of 42 projection welds. This job was formerly riveted. Welding is much easier than riveting because the operator does not have to line up the holes to insert rivets. This is frequently a difficult task, particularly where there are many rivets used in the assembly.

Seam welding has entirely displaced lock seams and soldering in the manufacture of fuel tanks. A variety of sizes and shapes of fuel tanks are needed to meet the requirements of International Harvester's diversified line of tractors and industrial power units. Most of the seam welding machines are now equipped with electronic timers. Magnetic timing devices are employed on all butt-flash and projection welding machines.

The accompanying illustrations present some of the welding details of the tractor production story. (All photographs furnished through the courtesy of International Harvester Co.).

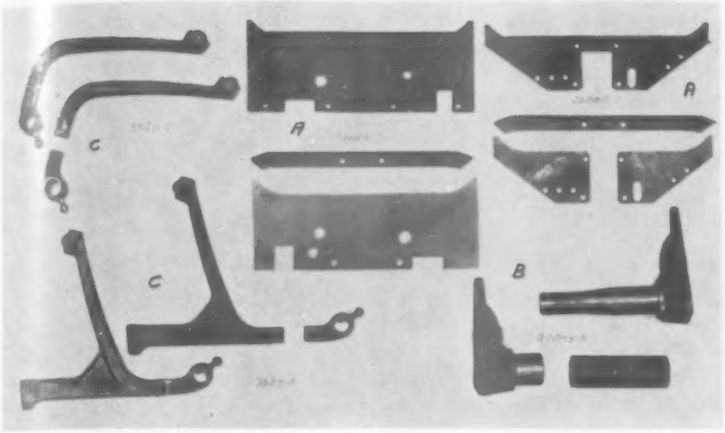


Fig. 7—(A) Fuel tank supports. Angles are projection welded to sheets. (B) Track support shaft. Forging is welded to bar 2¾ in. dia. Couldn't be made in one forging. (C) Brake foot levers. Ball end is completely machined before welding.

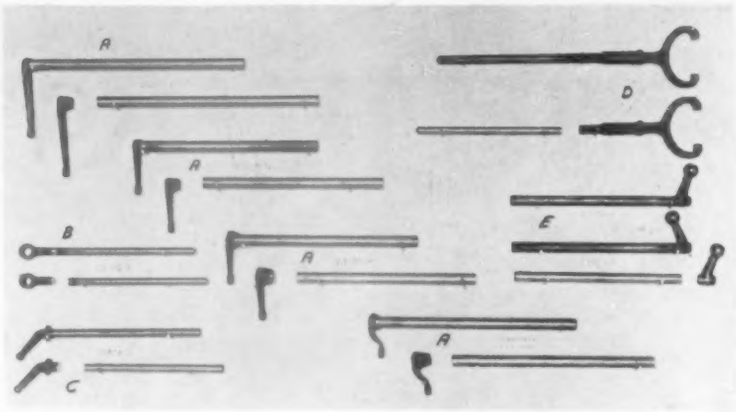


Fig. 8—(A) Clutch throw-out lever assembly. Forgings are welded to cold-rolled steel shafts. (B) Power take-off lever. Forging is flash welded to cold-rolled steel handle. (C) Gear shift lever. (D) Forging is welded after finishing. (E) Steering clutch shafts. Ball end finished before it is flash welded.

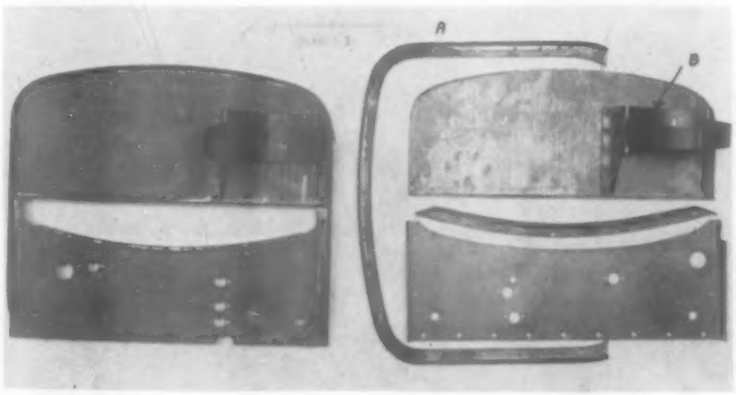


Fig. 9—TracTracTor dash assembly. (A) Angle frame and air cleaner support (B). Projection welded using 42 projections. Formerly riveted.

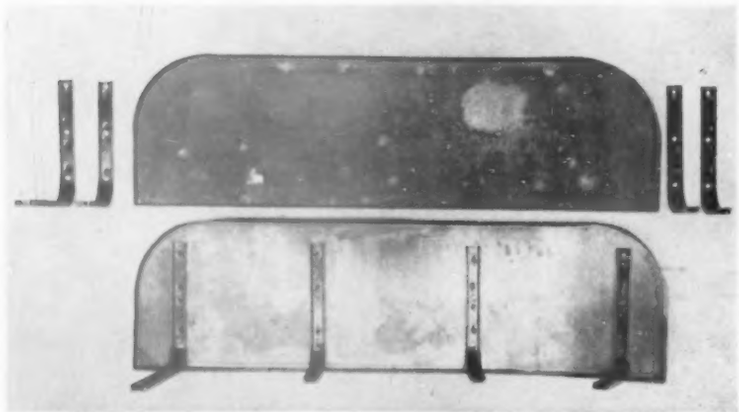


Fig. 10—TracTracTor fender. Four brackets projection welded using four flat-top projections to eliminate possibility of surface marks on welded fender. Formerly bolted.

Pressure Control in Spot Welding of Non-Ferrous Metals

By RICHARD H. TAYLOR*

★ In the past 10 years the spot welding method for joining metals has been improved to such an extent that it is no longer a rule-of-thumb process. Some time ago, it was common engineering practice to specify twice as many spot welds on a piece as would have been necessary if all the welds were known to be sound. Now however, by using modern equipment and up-to-date welding methods, the engineer in most cases can depend on 100% sound welds. Even the Army and Navy specifications call for spot welding on such vitally important jobs as airplane assemblies.

*Electroloy Co., Inc., New York City.

Spot welding may be defined as the heating and forging together of two pieces of metal by passing a high-amperage electric current through a limited area of the pieces, while pressure is applied over this area. It is apparent from this definition that several variables can affect the final results. All of these variables should be controlled within close limits to insure consistently good welds. The more important of these variables are:

1. The material to be welded:
   a—Chemical and physical characteristics.
   b—Uniformity.
   c—Surface condition.
2. Voltage and amperage used in welding.
3. Shape and contact area of the electrode.
4. The time current is allowed to flow.
5. Pressure.

The first variable, with the possible exception of the surface condition of the metal, is specified by the requirements of the product, and usually cannot be controlled in the welding process. It follows then that the best welding machine is the one equipped to control the last four of the above variables most easily and most accurately. At present the welding current is accurately controlled through improved transformer design and by phase-shifting on electronic control devices. Various improved alloys of great hardness and electrical conductivity prevent the deforming of electrodes, and thus control the size and shape of the contact. Electronic timers have been developed to control the welding time within extremely narrow limits.

It is the fifth variable, that is the welding pressure, which recent experiments have shown requires more accurate control. To be sure all modern spot welders are equipped to supply and regulate the welding pressure. In

(Continued from page 61)

Fig. 11—Wheel tractor transmission cover. (A) Tapping bars are projection welded with extra high projections to allow gasket to be welded between bar and cover. (B) Reinforcements are projection welded to obtain added thickness for dowel holes.

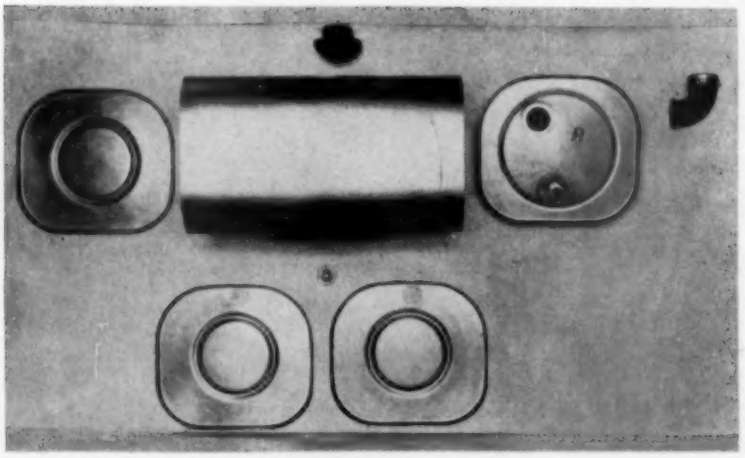


Fig. 12—One type of tractor fuel tank. (A) Formed parts are spot welded ready for seam welding. Gasoline compartment (for starting fuel) is made integral with an end sheet. Drain fitting and filler neck are spot welded and located for brazing. Drain fitting and neck brazed. Baffles pressed in and spot welded. Ends pressed in and seam welded. Gasoline compartment filler elbow brazed in.

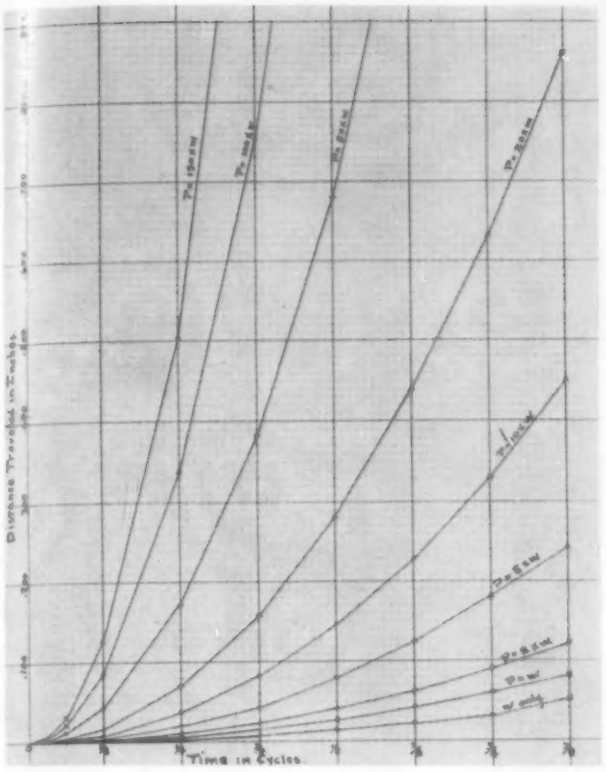


Fig. 1 — Acceleration chart to show distance traversed by a "freely-moving" mass when put under various pressures. Emphasizes importance of pressure-to-mass ratio.

some cases, especially where air cylinders are employed, this is controlled within narrow limits. However, merely controlling the amount of pressure on the electrode does not necessarily bring about the desired result. This is due to the fact that pressure does not act independently of mass. If pressure is applied to a large mass, the resulting action will necessarily be slow. If the same pressure is applied to a small mass a much faster reaction will take place.

Electrode Speed

In welding non-ferrous metals it is extremely important that the electrode follow up the softened metal with great rapidity, at the moment that the metal reaches a plastic or liquid state. This is because the temperature range for welding these metals is extremely limited. Experimental evidence indicates that liquefaction must occur to effect a true weld, but if the temperature is allowed to rise beyond the melting point, before the pressure is applied, violent arcing occurs, with the result that the pieces being welded are spoiled and usually the electrodes must be redressed.

It may be well to note at this point that conventionally the movable electrode on a spot welder is attached rigidly to the upper horn, which in turn is attached to a vertically moving head and the flexible end of the transformer secondary. All of this constitutes a considerable mass which must be moved in order to move the electrode. This heavy mass, together with friction of moving parts, prevents the quick starting which is essential in preventing the arcing mentioned above, unless excessively heavy pressures are used. To make this point clear refer to accompanying chart (Fig. 1). This shows the distances freely moving masses will travel under varying pressure. Points have been plotted using distances traveled in thousandths of an inch as ordinates (vertical scale) and elapsed time in cycles of 60-cycle current as abcissa (horizontal scale). These points are plotted for various ratios of pressure to mass. The curves show decisively that rapid starting occurs only when the ratio of pressure to mass is ten-to-one or greater.

Mass Must Be Reduced

If the average weight of electrode, electrode arm, head and flexible end of the secondary of a medium-size spot welder totals about 150 lbs., it would require a pressure of 1500 lbs. on this machine to produce moderately quick starting. Such heavy pressure cannot be used for various reasons: (1) Non-ferrous metals are characteristically soft, and heavy pressure would cause excessive deformation at the weld, and (2) such a heavy pressure would tremendously reduce the resistance at the point of junction of the two pieces of metal. This would result in abnormally high current requirement for welding.

There appears to be only one method for making the electrode assembly capable of rapid movement without in-

(Continued on page 71)

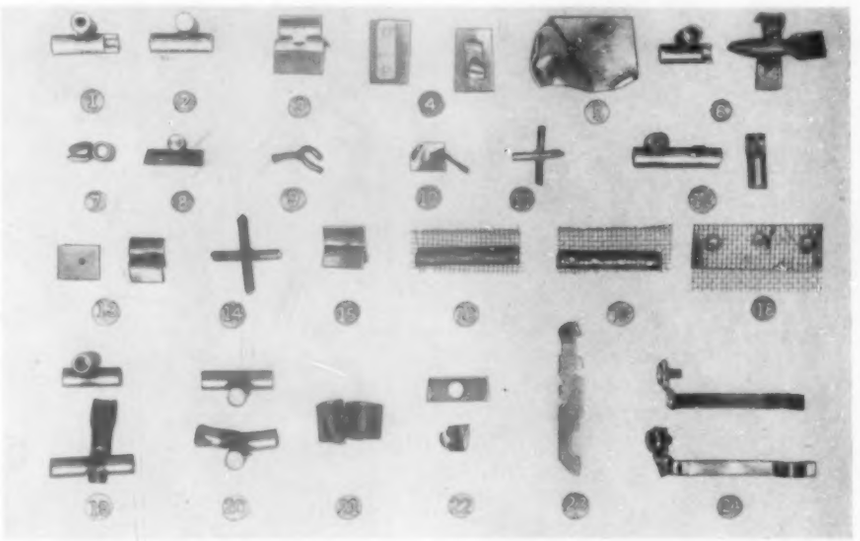


Fig. 2—A number of examples of spot welded non-ferrous parts. (1) ¼" dia. aluminum tubing; (2) ¼" dia. soft aluminum; (3) .065" aluminum (2S); (4) .035" aluminum—projection weld; (5) 2S aluminum .063" to .025"; (6) ¼" OD 3/16" ID soft copper tubing; (7) ¼" copper tubing to copper wire; (8) .203" dia. soft copper wire; (9) .083" soft copper wire (tested); (10) .010" copper to stranded wire; (11) .095" dia. soft solder.; (12) ¼" dia. leaded brass; (13) .05" soft brass projection welds; (14) .134" leaded brass; (15) .020" soft brass to .040" bronze; (16) bronze screen to ¼" dia. steel; (17) bronze screen to ¼" dia. brass; (18) bronze screen to .049" steel; (19) ¼" dia. copper tube to steel; (20) ¼" dia. leaded brass to steel; (21) .049" brass to .032" steel; (22) pure silver button to .020" bronze; (23) silver-molybdenum to copper; (24) brass to bronze—projection weld.

Simple Shop Device For Pre-Fluxing Bronze Rod

★ Wherever large bronze-welding jobs are done, or a considerable amount of bronze-welding is carried on, it has been found convenient to coat the rod with flux prior to welding. The usual practice has been to heat the rod along its entire length with the blowpipe and then sprinkle it with flux, or roll it in flux in a shallow container. The heat in the rod causes the flux to adhere in the form of a coating.

Since the coating obtained in this manner is not always uniform and the method involves considerable waste of flux, one contract shop recently designed a device which greatly facilitates application of flux to the rod. Through its use, operators have been able to obtain a more uniform rod coating which helps them to make deposits closer to finished dimensions, reducing rod and machining costs. Also, their welding speed has been increased considerably, resulting in a corresponding decrease in gas consumption. More pounds of rod are deposited per hour and flux waste has been greatly reduced.

The few materials which are needed to construct the device will be found in almost any shop. These include a section of 2-in. pipe about 3 ft. in length, a small piece of ¼-in. steel plate, a piece of heavy sheet metal, and several ⅜-in. steel welding rods.

A pattern for the funnel-like top section of the container should first be laid out and the sheet metal cut to shape. This part should be designed in such a manner that, when completed, the lower opening (the smaller of the two) will have a diameter of 2 in. so that it can be joined to the pipe. The upper opening should be large enough to permit quick and easy insertion of the hand. The circular base of the container and 1¼-in. disk for the end of the stirring rod also should be cut to shape from the ¼-in. plate before proceeding with the assembly of the device.

The sheet metal for the top section (see sketch) should be formed first by bending it to shape and welding the ends together. Next trim the length of 2-in. pipe so that, when it is joined to the sheet metal top section, the overall length of the combination will be 36 in. Weld the top section to one end of the pipe. Then center the pipe vertically on the circular plate and weld it to the base as illustrated. Remaining parts of the flux container, including braces, legs, and upper and lower rings for holding fluxed rod, consist of ⅜-in. steel welding rod.

To complete the flux container, cut pieces of the ⅜-in. steel rod and weld them as legs to the ¼-in. base plate. These legs should be sufficiently long to permit the insertion of a Bunsen burner, oxy-acetylene blowpipe, or other heating source beneath the flux container.

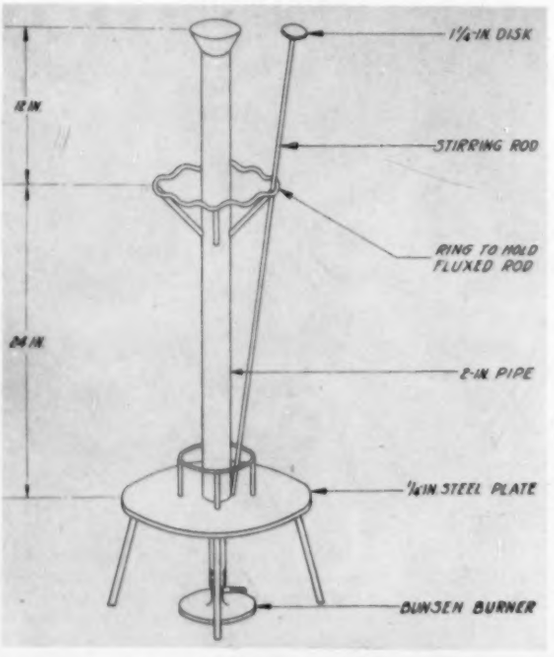
Rod Coating Procedure

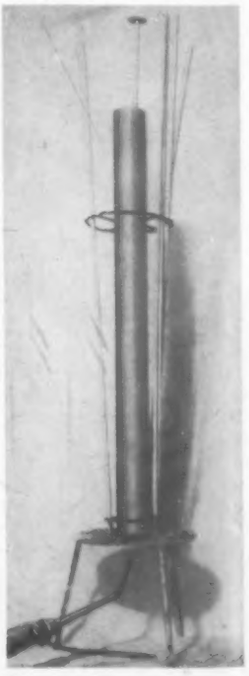
To pre-flux bronze rod by means of the flux container, first mix a medium paste of brazing flux and clean water. In using a container of the size described, the correct mixture should consist of approximately 4 lbs. of flux and 1 qt. of water; this amount will be sufficient for coating 100 lbs. of ⅜-in. rod. Pour the mixture into the container and heat it over a Bunsen burner or blowpipe. Stir the flux thoroughly during heating, using the stirring rod provided for this purpose.

When the mixture is brought to a temperature of approximately 190 deg. F., it will take on a glazed appearance and will then be ready for application to the rod. To coat the rod, simply dip it into the hot flux mixture and withdraw it as quickly as possible. Do not allow the rod to become heated. After the dipping, place the rod in the rod holder formed by the two rings and allow the flux coating to solidify.

After the coating applied in this manner has solidified, it will be found to be smooth and uniform. If the flux deposit is not as heavy as desired, the coating can be built up in successive layers by redipping the rod in the heated flux mixture. Care should be taken, however, that the rod is cold each time additional flux is applied. Only 15 min. are required for pre-fluxing 100 lbs. of ⅜-in. bronze rod.

When the required amount of rod has been coated, the unused balance of the flux mixture should be poured, while hot, into an air-tight container. Sealing the container will preserve the mixture for future use.





(Left) Details of simple device for flux-coating welding rod prior to gas welding. (Right) Flux mixture is heated by means of an oxy-acetylene torch. Coated rods are placed in the outer ring holder. Photo (Linde Air Products Co.).

New Product Developments

(Continued from page 54)

"Dependon" safety shield can be worn over regular eyeglasses.

Sellstrom Introduces All-Purpose Safety Shield

★ A recent contribution to offset hazards to eyes and face is a device known as the "Dependon Safety Shield." The window material is synthetic, made to withstand heat, sparks, and acids, and is so removed from the face as to allow good ventilation, and the wearing of prescription glasses or goggles. This material is available either clear or tinted and is made in various depths from forehead to chin.

The "window" is attached to a comfortable headband by special friction swivel joints that enable the wearer to raise the window up entirely out of the way, and without interfering with spectacles or goggles. This new device is particularly recommended for grinding and chipping operations, degreasing, removing old paint or scale and for oxy-acetylene and spot welders. For further information, write to Sellstrom Mfg. Co., 615 N. Aberdeen St., Chicago, Ill.

» «

Thor "Bantam" pneumatic grinder weighs 18 oz. and is 5½ in. long.

Portable Pneumatic Grinder Weighs Only 18 Ounces

★ A new rotary air grinder for small-wheel work, known as the Thor "Bantan" has been announced by Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago. As illustrated, it is but 5½ in. long and weighs only 18 oz. Small size and light weight make it easy to handle for delicate precision work. Operating at a free speed of 14,000 r.p.m. the "Bantam" is suitable for use with a wide variety of accessories. Mounted abrasive wheels in all shapes and sizes from the smallest pointed wheel up to 1½ in. diameter round wheels can be used efficiently. Other accessories such as rotary files and steel cutters, sanding discs, wire brushes, saw blades, and buffing and polishing wheels can also be used.

Standard equipment includes a push-button throttle that may be locked for continuous operation, ¼ in. collet and swivel hose connection. Lever throttle may be had in place of push button, if desired, and the adaptor for collet can be replaced by an adaptor with chuck. Further information may be had by writing to the company and asking for Bulletin P20.

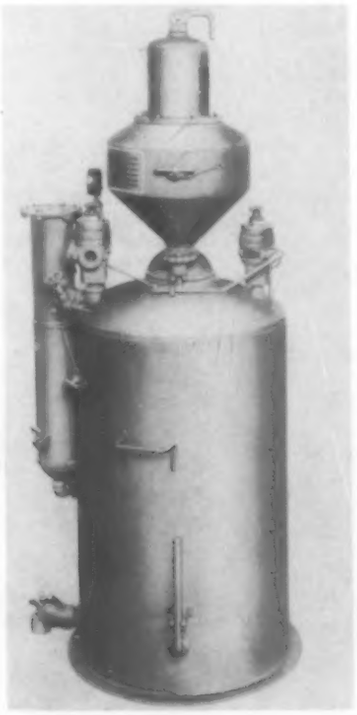
» «

Portable Acetylene Generator

★ A new acetylene generator, known as the Oxweld MP-9 medium-pressure acetylene generator, and designed to combine portability with the operating advantages usually found only in larger units, has just been announced by The Linde Air Products Co. The MP-9 weighs only 129 lb., and can readily be moved. It holds 25 lb. of size 14 ND Union Carbide and will deliver as much as 50 cu. ft. of acetylene per hour at any desired pressure up to 15 lb. per sq. in. Several hours of continuous welding or cutting, on all except the heaviest work, can be obtained from one charging.

The generator produces a smooth flow of clean, dry acetylene with no appreciable variations in pressure. Operations of the generator is simple since only one handle is used to start or stop generation of acetylene, and to adjust delivery pressure. After starting, operation is fully automatic.

Other advantages are such features as two relief valves, one for the generating chamber, and the other for the hydraulic back-pressure valve; a large hydraulic back-pressure valve, which prevents the carrying over of water to the hose, and checks any reverse flow of gases; and in interlocking mechanism which allows only the proper sequence of operations during recharging. The generator is constructed of welded steel parts.



Oxweld MP-9 medium-pressure acetylene generator.

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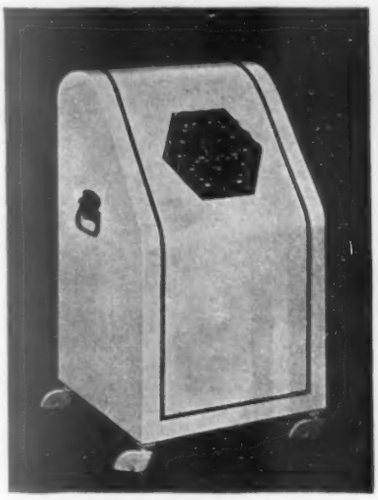


Sight-Feed a-c. welder is said to maintain rated amperage under continuous operation.

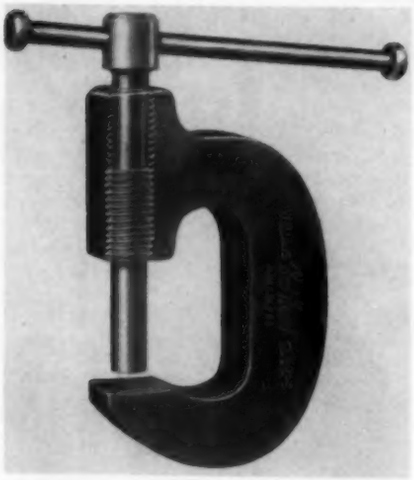
Sight Feed A-C. Arc Welder

★ The Sight Feed Generator Co., Richmond, Ind., has developed the Sight Feed A-C. Arc Welder, available in four capacities: Model 150 (10 to 150 amp.); Model 210 (10 to 210 amp.); Model 260 (10 to 260 amp.); and Model 300 (10 to 300 amp.). They are designed for 60 cycle, 220-volt, single-phase operation, but can be furnished to operate on 50-cycle circuits whenever specified.

Due to special transformer construction, the new welder will maintain its rated amperage under continuous operation. In other words, as the transformer warms up it is unnecessary for the operator to change the current setting. It is claimed that the short circuit current surge in the primary circuit does not exceed 8 per cent for any current setting. This, it is said, eliminates tendency of electrodes to stick to the work. It is further claimed that the machine develops a constant energy arc which gives uniform penetration regardless of arc length. Plug-in type connections are used, eliminating the use of moving parts. This reduces replacement and maintenance expense. All Sight Feed A-C. welders are equipped with an 8 ft. power cord and plug, 20 ft. welding cables, electrode holder and helmet.

» «

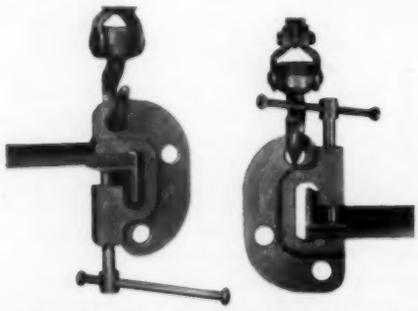
NEW DAVIS FACE-SHIELD—A bulletin covering a new line of face-shields, which are now being used to protect workers from dust, sparks, heat, and glare, has been published by Davis Emergency Equipment Co., 55 Van Dam St., New York City.



Case-hardened threads of this clamp are protected from weld spatter in all working positions.

"Red Head" Welding Clamps

★ A patented "C" clamp designed especially for welding service, but also applicable to general shop use has been developed by Chicago Boiler Co., 1965 Clybourn Ave., Chicago, Ill. The important features cited in connection with the new "Red Head" clamps are the use of case-hardened threads that are positively protected from weld spatter in all working positions of the clamp. Longer life is secured by using heat-treated threads. A heat-treated chrome-molybdenum steel handle provides great strength to resist bending. The body of the clamp is made from heavy steel plate which is case hardened to increase its strength and resistance to bending.



How the Style 8000 clamp is used as a lifting hook. Clamping surface is grooved to prevent slipping.

Because of these features, it is claimed that the "Red Head" clamp will outlast many of the conventional type clamps that have to be discarded because of damaged threads, bent handles, or twisted bodies. It is pointed out, for example, that with conventional clamps the exposed threads are easily damaged by welding spatter or by accidental contact with the electrode. Chicago Boiler Co. developed this new "C" clamp primarily to eliminate the trouble which they had experienced in their own shop with the ordinary type of clamp.

A total of 14 different styles and sizes of "C" clamps are available—Style 4000 with ¾ in. screw, Style 6000, with 1 in. screw, and Style 8000 with 1¼ in. screw. This latter clamp (Style 8000) is known as an extra-heavy lifting clamp and is provided with holes in the web which permit use of the clamp as a lifting hook. The clamping surface on this design of clamp is grooved to prevent slipping. It can also be used as a welding clamp. In addition to standard sizes, Chicago Boiler Co. can furnish special sizes and shapes to order where required. For certain jobs, a longer clamp opening may be needed, or a deeper throat may be required because of the shape of the work. Price lists and any further information can be obtained by writing to Chicago Boiler Co., 1956 Clybourn Ave., Chicago, Ill.

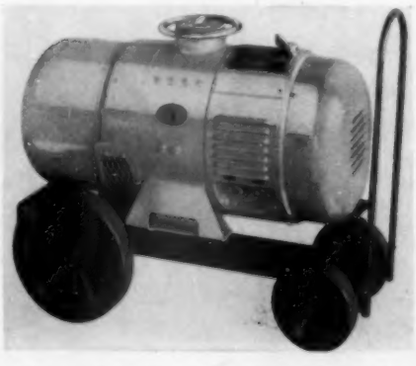
» «

New Wilson Arc Welder Has Only One Control Device

★ A new single-operator motor-generator arc welder, requiring only one control device for operation, has been announced by Wilson Welder and Metals Co., Inc., 60 East 42nd St., New York, N. Y. Known as the Wilson "Hornet," this welding machine employs for its control a single, handwheel located on top of the unit. Adjustment of this handwheel permits the operator to obtain an infinite number of current settings. Dial markings are so accurately calibrated that electrical meters are not required.

Single-pole control design assures a current output that will not vary, resulting in a constant, uniform arc at all times. Accidental reversal of polarity is impossible, because the electric control is so designed that a small snap switch must be flicked by the operator to change the polarity. The "Hornet" is a two-bearing unit, with motor rotor and generator armature mounted on a common shaft. Adequate ventilation is furnished by propeller blades attached to the revolving shaft.

The Wilson "Hornet" is supplied in three sizes—Frame BA 200, rated 200 amp.; Frame BA 300, rated 300 amp.; Frame BA 400, rated 400 amp. Further information and descriptive literature may be obtained by writing to Wilson Welder and Metals Co., Inc., 60 East 42nd St., New York, N. Y.



Wilson "Hornet" arc welder has a single hand-wheel control mounted on top.

Champion Gray Devil No. 2 Electrode

★ The Champion Rivet Co., Harvard Ave. & E. 108th St., Cleveland, Ohio, announces a new shielded arc welding electrode—Gray Devil No. 2. This is a straight polarity electrode similar in operation to the regular Champion Gray Devil. It is claimed that Gray Devil No. 2 electrode will deposit an exceptionally smooth bead with easy slag removal. Additionally, the claim is made that Gray Devil No. 2 works satisfactorily on all applications where there is poor fit-up.

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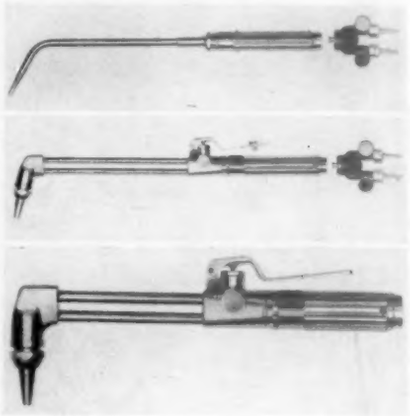

Top—New W-108 Prest-O-Weld welding blowpipe. Middle—New C-108 Prest-O-Weld cutting blowpipe. Bottom—Model CW-108 cutting attachment.

Prest-O-Weld Welding and Cutting Equipment

★ A number of improvements are featured in the new line of Prest-O-Weld welding and cutting apparatus, recently introduced by The Linde Air Products Co. This new equipment consists of a welding blowpipe, cutting blowpipe, and cutting attachment. All retain the detachable valve body construction, said to be exclusive with Prest-O-Weld equipment, which permits quick changing from welding to cutting, and from cutting to welding.

Among principal features of the W-108 welding blowpipe are the individual mixers in every head making correct flame adjustment easy, and giving definite resistance to flashback. Both the oxygen and acetylene for this "balanced-pressure" blowpipe may be set at approximately the same pressure in lb. per sq. in. as the number of the head. The welding heads provide a long, slender flame with a well-formed inner cone that permits thorough heating of even the bottom of the vee, and provides good control of the welding puddle. Special heads that confine the flame to a small area are available for welding auto fenders and similar work.

The new C-108 cutting blowpipe and the CW-108 cutting attachment are also constructed on improved design principles. A lower preheat oxygen pressure permits a large flame for cutting very dirty or heavily scaled material. Like the welding blowpipe, they have improved flashback resistance, are

strongly built and well-balanced for ease of handling.

This apparatus is available separately or in combination outfits. In addition, since the new blowpipe handles can be used with detachable valve bodies alread in use, owners of Prest-O-Weld apparatus can take advantage of these improved design principles economically.

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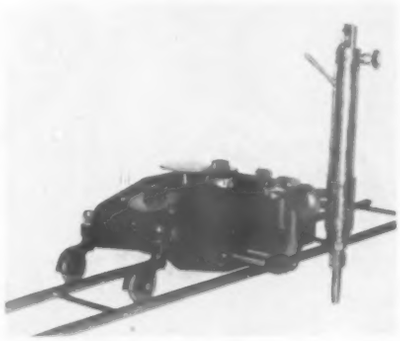


Portable flame-cutter has a speed range from 4 in. to 60 in. per min. Working parts are completely enclosed.

"Kut-Mor" Flame-Cutting Machine

★ A portable motor-driven flame-cutting machine has been introduced by Kut-Mor, Inc., 2532 Irving Park Rd., Chicago, Ill. The new Kut-Mor machine has a variable speed motor with a positive speed adjustment. It can travel in either forward or reverse direction, with a speed range from 4 in. to 60 in. per min. A universal type motor is used permitting operation on either a-c. or d-c. current at 110 or 220 volts.

Equipment includes a 4 ft. track for straight line cutting, but two or more tracks may be connected for continuous cutting. A radius rod is furnished to permit circular cutting. The torch holder is so designed that every conceivable angle of cut is possible and two holders can be mounted for multiple cutting.

Working parts are completely enclosed and protected. Rear wheel housings are swiveled to facilitate travel in circular cutting. Controls are conveniently located and easily operated. Weight is approximately 45 lbs., making the unit portable.

» «

New Electrode Produces Smooth Welds for Finish Beads

★ A new arc welding electrode, which will facilitate finishing operations on welded products, by eliminating the need of dressing or smoothing welded seams in many applications, is announced by The Lincoln Electric Co., Cleveland, Ohio. The new electrode, known as "Fleetweld 10," is designed particularly for finish bead welding on "U" groove welding in down-hand position.

The electrode provides full slag coverage and a smooth weld deposit. The bead is uniform and regular without square shoulders. The metal smooths out evenly during welding and the line of fusion with the base metal is practically unnoticeable. Finish beads can be made in V-butt joints in flat position which are flush with the surface of the plates. The surface of the bead made with the electrode has much less of the "rippled" effect which characterizes the usual weld deposit.

The ability of "Fleetweld 10" to produce smooth welds for final-pass beads will be found advantageous in all applications where appearance is important. Manufacturers will be able to save time and labor formerly required to "dress" the welds. Where the nature of the product requires grinding, buffing and polishing to assure best appearance, the finishing work will be greatly simplified as far as welded seams are concerned.

"Fleetweld 10" can be used with either normal or reverse polarity with d-c. current, or with a-c. It is made in two sizes in 18-in. lengths, ¼ in. and 5/16 in., and is packed in 50-lb. containers.

» «

Manganal Tite-Kote Electrodes

★ A new Tite-Kote electrode for a-c. welding has been introduced by Stulz-Sickles Co., 134 Lafayette St., Newark, N. J. This new electrode is similar to the regular Manganal electrode, but has a special self-peeling coating, which it is claimed does not retard the quick cooling of the weld deposit. This feature insures the same ductility and toughness obtained in weld deposits made with Manganal bare electrodes. It is stated that prices are the same as for the standard Manganal Tite-Kote electrode for d-c. welding.

» «

Dymonhard—A New Hard-Facing Alloy

★ Dymonhard Corp. of America, 30 Rockefeller Plaza, New York City, has developed a new hard-facing alloy after extensive research by a group of metallurgists and welding engineers, who have long been connected with the manufacture of hard-facing materials. While the compositions of these new alloys are not stated, it is said that they contain the rarest metallic elements and that they comprise some of the hardest materials ever developed for this purpose. Coupled with hardness, Dymonhard facings are also said to possess a high degree of toughness. It is claimed that Dymonhard facings can be passed through the arc (or gas stream) without "shatter or loss of any of the contained elements."

These new hard-facing rods are available for both electric arc and oxy-acetylene application. All rods are flux coated and are claimed to be absolutely fumeless. The coating is also said to be waterproof. Dymonhard facings are available to meet every condition encountered such as abrasion, corrosion, strength and toughness at red heat, and impact. It is emphasized that Dymonhard facings are applied by actual fusion to the base metal. It is claimed that they are not brazed to the underlying metal. For this reason, it is further claimed that the overlay will not chip or spall under severe impact.

Dymonhard facings can be applied to any ferrous metal including cast iron. They have a dense structure free from porosity, slag and impurities. It is stated that these facings have a low coefficient of contraction which makes it easy to apply them to any ferrous base.

There are seven types of Dymonhard facings now available in 5/16 in., ¼ in. and 3/16 in. rods. Each of them are available for oxy-acetylene or arc welding:

DYMONHARD—No. 90
Brinnell 700 Plus—Red Tip.
Uses: Where extreme red heat, corrosion and abrasion are present, such as coke pusher shoes, drill bits, coreheads, scarifier teeth, hot shear knives, and parts subjected to rapid changes of temperature.

DYMONHARD—No. 91
Brinnell 600 Plus—All Gray.
Red heat and acid resistant. High in abrasion-resistant properties. Should not be used where extreme shock is a great factor.

DYMONHARD—No. 92
Brinnell 550—White Tip.
The companion rod to 91 alike in every particular except the Brinnell has been reduced to 500 to permit application to parts subject to severe shock. This rod is exceptionally tough.

DYMONHARD—No. 93
Special Valve Rod—Green Tip.
This rod is for extreme corrosion, acid conditions and medium abrasion. Structure dense and fine grained. Will take high polish, will machine easily and will harden under impact. Ideal for pumps, sleeves, valves and inserts. Can be applied to all metals, including cast-iron, and is non-porous.

DYMONHARD—No. 94
Brinnell 575-600—Yellow Tip.
A highly abrasive-resistant universal rod for both gas and arc application on all metals and alloys where high acid and red heat are *not* prime factors. Ideal for digger teeth, plow points, shares, also road building, mining equipment applications, and coke hammers.

DYMONHARD—No. 95
Brinnell 500—Brown Tip.
This rod is for both gas and arc application and has a hardness well over 500 Brinnell and is extremely tough. Can be built up to most any desired thickness. Exceptionally good for rock and gravel industry and on applications where less expensive materials must be used. This product should be used to build up badly worn parts and as a base for top facing with one of the high grade Dymonhard rods.

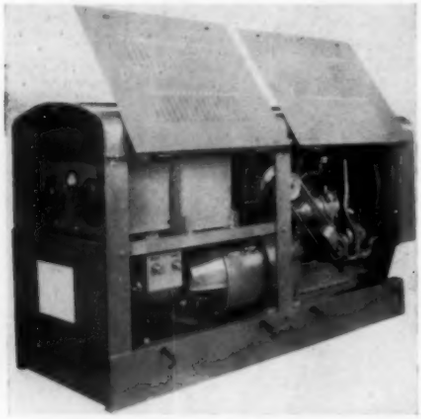
DYMONHARD—No. 96
Brinnell 385-444—Blue Tip.
This rod is exceptionally tough and has a Brinnell of 385-444. For use on contractors' equipment such as shovel teeth, tractor treads, scrapers, latch bars, etc. Excellent for building up purposes and as a base for top facing.

» «

New Diesel Engine Driven Arc Welder

★ A new 300 amp. diesel engine driven arc welder, which is equipped with gasoline engine starting rather than the conventional motor starter with storage batteries is announced by The Lincoln Electric Co., Cleveland, Ohio. This new welder simplifies the use of diesel power. The diesel engine which drives the welder compares favorably with gasoline engines in dependability of starting, simplicity, weight and cost, as well as in operating speed, it is stated.

The gasoline engine used for starting the welder is a small auxiliary mounted above the diesel engine. It is started by means of a hand crank. A belt drive, engaged by means of a clutch, connects the starting engine to the diesel. Starting in extremely cold weather is facilitated by the fact that the cooling system of the small gasoline starting engine is connected into the cooling system of the diesel. This arrangement



Lincoln 300-amp. diesel engine-driven arc welder equipped with gas engine starter.

makes it possible to warm up the diesel by running the starting engine a short time and allowing the heated water to circulate through the diesel engine.

The new Lincoln diesel-driven welder is said to cut fuel costs 33 to 86%, depending upon the type of fuel oil used. The diesel uses only 1.5 gallons of fuel oil per hour at full-load operation, as compared with 2.75 gallons of gasoline per hour in the case of conventional gasoline engine welder drive. Total savings, including such items as transportation of fuel, loss, etc., are, in many cases, claimed to be as high as 40 cents per hour.

The arc welding generator used on the new welder is the 300 amp. "Shield Arc SAE" unit, equipped with dual continuous control. Other features of this generator include: extra wide welding range; independent excitation; laminated magnetic circuit; high capacity; high efficiency; cool operation; all-purpose meter; and all of the other features which long experience has shown are necessary to ease of operation, proper performance and maximum welding economy.

The frame of the arc welding generator is attached directly to the diesel engine bell housing. The generator shaft is connected to the engine flywheel by a special type of flexible coupling. Mounting for the entire unit is provided by a substantial channel frame. The price of the new diesel engine-driven welder, equipped with engine starting, compares favorably with that of gasoline-driven arc welding sets, it is stated.

» «

Two New Imperial Welding Outfits

★ A new welding outfit—No. 1178—embodying the new style Imperial welding torch and new double-gauge regulators, has been introduced by The Imperial Brass Manufacturing Co., 1200 West Harrison St., Chicago, Ill. The new Imperial welding torch has an improved cooling design which provides even greater protection against heating of the handle during welding. This extra protection has been attained by introduction of a section of non-conducting metal in each tip just above the point where it attaches to the handle.

Imperial double-gauge regulators, furnished with the outfit, have a forged body which is non-porous, light and very strong. A new simplified design makes these regulators easy to adjust and reduces repairs.

The No. 1178 outfit includes welding torch with 3 welding tips, protector caps for tips, two double-gauge regulators, oxygen and acetylene hose, goggles, spark lighter, wrenches, adapter and welding handbook. The same outfit can also be had complete with cutting attachment, at a slight additional cost.

The new Imperial No. 1118-WC unit is a complete welding and cutting outfit designed to handle all types of oxy-acetylene welding, from the lightest to the heaviest, and can cut wrought iron and steel up to 12 in. thick. This unit includes the new Imperial welding torch with improved cooling design and the new Imperial regulators having forged body and simplified adjustment feature.

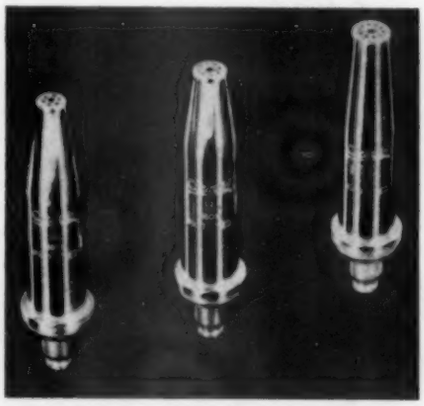
The No. 1118-WC outfit consists of welding torch with 5 tips; protector caps for tips; cutting torch with 3 tips; double-gauge oxygen and acetylene regulators; 25 ft. lengths of oxygen and acetylene hose with connections; deluxe goggles; spark lighter; wrenches; tank adapter; and welding and cutting handbook.

» «

New Cutting Nozzles

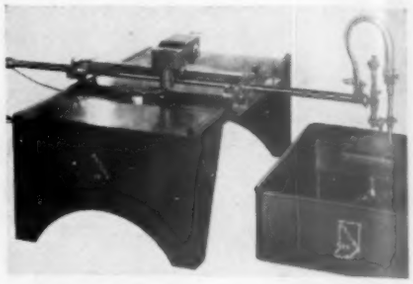
★ New Oxweld precision cutting nozzles are now available which make cuts of such quality that usually no subsequent machining is required. These nozzles are for use in Oxweld machine-cutting blowpipes, types C-35, C-37, C-39, and C-48, and can be obtained from The Linde Air Products Co.

The new nozzles are superior to regular cutting nozzles for three reasons. First, the cutting oxygen passage is highly polished, thus producing a smooth gas flow without deflection or turbulence. This results in a clean, unbelievably smooth face of cut. Second, the preheat holes are smaller and spread over a larger circle, so that the heat is less concentrated on the line of cut. This results in a squarer, cleaner, sharper upper edge, a smaller kerf, and a saving in preheat gases. Third, the cutting oxygen passage is exactly vertical, so that when cutting shapes or circles, the face of the cut is exactly true all around.



Oxweld precision cutting nozzles have a highly polished cutting oxygen passage.

» «



Model-100 flame-cutting machine.

I.O.C. Model-100 Flame-Cutting Machine

★ Indiana Oxygen Co., 435 South Delaware St., Indianapolis, Ind., has developed its Model-100 flame-cutting machine to meet the requirements of large and small users who can use mechanical flame-cutting profitably. This new design provides an automatic cutting machine of a universal type operated by an electric motor. It can be used for straight, curved, and circular cuts (both normal and beveled) using diagrams drawn on paper, or following metal templets with an automatic or semi-automatic guide and magnetic tracer. The essential parts of the machine comprise: (A) All-welded steel table; (B) A chassis (carriage) on wheels, with support for cutting torch, and two steel rails; (C) Cutting torch with tips of different sizes; (D) A platform with hood, supporting the motor; (E) Accessory equipment.

An all-welded steel table weighing approximately 1000 lbs. provides adequate rigidity and strength, which help to eliminate vibration and produce smooth operation. The top of the table is of 3/16 in. polished plate.

The chassis comprises an aluminum frame mounted on three chrome plated ball bearing wheels, each with two sets of bearings. Two wheels on the right side run in a grooved channel track, while a third wheel on the opposite side runs on a flat rail. A tubular arm extends through the axis of the single wheel and continues through that portion of the chassis frame which carries the other two wheels. This tubular arm is supported on either side of the chassis by two sets of ball bearing cone collars, which permit the tubular arm to roll.

Cutting torch is at the right end of the tublar arm and is supported on an adjustable vertical arm. The torch adjustment can be set for cutting at any angle from zero to 45 deg. A knurled adjusting wheel operates a hand gear to permit the vertical torch adjustment.

An 18 page booklet giving complete technical data on the Model-100 machine can be obtained by writing to the manufacturer at the address above stated. Practical information is included covering important points to keep in mind in construction of templets and directions for obtaining high precision cuts.

Brief Sketches of Welding Jobs

An experimental job built by Hay Machinery Co., Brawley, Calif. Designed to speed up hay harvesting and cut costs. Machine is self-propelled by a Ford engine.

Welders Turn to Invention And Build New Farm Implements

By F. HAL HIGGINS

★ West Coast farmers have turned to the welder in their local blacksmith and machine shops to tell him what is wanted for a certain crop job that they find is not being met by a machine or implement already on the market. As a consequence, the old ideas of "inventing" a farm machine in the factory and then taking it out and selling it to the farmer are being discarded to some degree and now factory engineers are going out to the great irrigated farming areas of Arizona, California, Oregon and Washington to pick up "gadget ideas" to take back to their plants to incorporate into next season's farm machines.

High-speed hay harvest is now sweeping the West and is destined to revolutionize the harvest of this most important crop. It all started with the welders on farms and in farm area blacksmith shops taking old automobiles and trucks and turning out "hybrid" mowers, side delivery rakes, pick-up balers and buck rakes to take advantage of the power still left in obsolete automotive equipment. These machines met the demand of the farmer for lower cost harvest of hay, especially alfalfa.

"Red" Bennett, welder at Patterson, Calif., has built himself a nice farmer business by "crossing" old automobiles with mowers, rakes, etc.

"Red" Bennett with a little shop at Patterson, on the West Side of the San Joaquin Valley in California, for example, began building his "Bennett Mowers" on old Dodge, Chevrolet, Buick and other cars three years ago. He couldn't turn them out fast enough at $350 and $450 each for a season or two. Down in the Imperial Valley, next to the Colorado river and Mexico, where as many as ten crops of alfalfa a year are taken, Eaves & Fuqua, Brawley blacksmiths, picked up some old obsolete Yellow Cabs and went to work with the welding torch to meet farmers' demands for higher speed in haying. The first machine produced set the valley "crazy" and they couldn't build them fast enough, packing all the welders into their little shop who could find floor space. Their side delivery rake is standard for hay harvest in the valley and is being sold in three states now. Each unit replaces men, tractors, and rakes.

» «

Electric Welding Doubles Efficiency of Pump Runner

★ Electric arc welding is now an accepted method of maintenance with the U. S. Indian Service Departments in Arizona. Recently the electric arc process was used to repair a pump which had been in service for 26 years.

One year ago this pump runner was throwing a head of 62 second-feet. After it was repaired by arc welding, as shown in the accompanying illustrations, it was put back into service and now produces a constant head of over 128 second-feet. This is an increase in efficiency of over 100%.

Here is a weld-fabricated side delivery rake with rubber tires, mounted behind an improvised tractor "converted" from an old Yellow Cab taxi. Photo (Jim Fairbank, University of California.)

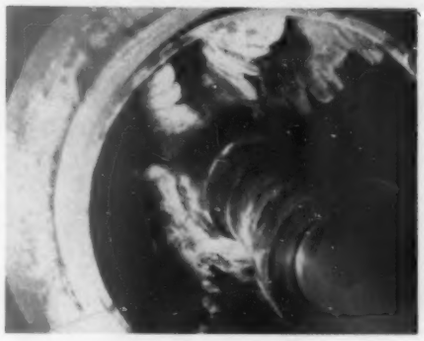


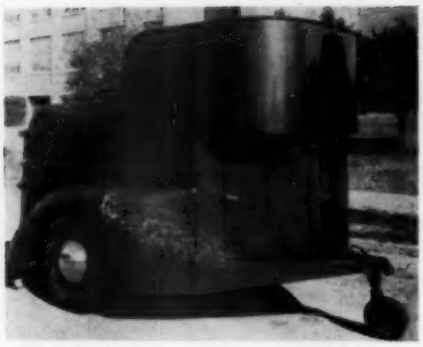
Fig. 1—Worn pump before repairs were made by arc welding.

Fig. 2—Pump runner ready for service after repaired by arc welding.

Another interesting feature of this job was the fact that arc welded repair eliminated costly replacement. Considering total cost, including patterns and freight, the expense of replacement would have been approximately $1500. By use of electric welding the pump runner was put back into service for $208.50. This represented a saving of 86% compared with replacement.

The procedure of repair was as follows: The fingers into which the runner had worn (see Fig. 1) were first broken off by means of a hammer. Pieces of ½ in. x 2 in. plate were cut and coated over with stainless steel weld metal by the electric arc, and then fitted to each blade. To provide a bond between the cast-iron and the new coated plate, the ends of the blades were coated over with "Softweld" electrode and the new pieces of steel welded in with "Fleetweld No. 7." The completion of the job consisted of building up cavitated spots over the entire runner by means of arc welding. This restored the runner to its original shape. Welding was done with equipment supplied by The Lincoln Electric Co.

In order to facilitate the welding, the entire pump was preheated to approximately 600 to 800 deg. F. before welding. Peening was also employed frequently to compact the weld metal.



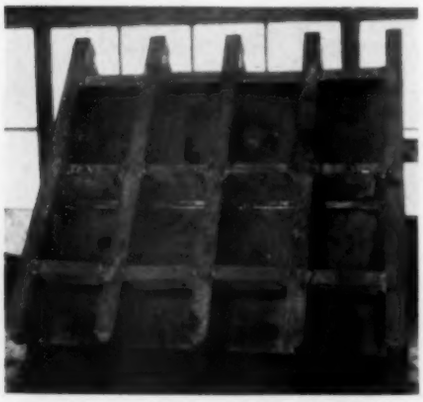
All-welded steel trailer costs 20% less to make than former wooden type with bolted angle iron frame.

Trailer Redesigned for All Welded Steel Construction

★ The Leeson Trailer Co., Tuscon, Ariz., formerly made their frames from angles and channels bolted together. The floors and sides were of wood. Following considerable study and experiment, which brought to light certain advantages to be obtained with welded construction, they changed their bolted frame design to welded construction. Just recently they went a step further and have worked out a complete design for all-welded steel construction. The illustration shows the distinctive appearance of the new trailer.

Particular attention is called to the fenders. These are composed of 17 separate pieces of steel welded together, after being pressed into shape in wooden forms by means of a hydraulic ram. This method makes it possible to produce the trailer with less than 10 lbs. of scrap loss, since each piece of steel may readily be fitted into the construction. The welding is done by the shielded-arc process with equipment supplied by The Lincoln Electric Co.

Surprising as it may seem, this trailer, although much stronger and better looking than when produced with wood construction, actually costs 20% less to make. At the same time the manufacturer is able to sell the new product more readily at a 25% higher price. The unit illustrated sells for $850.00.



Heavy welded plate construction as used in rock crusher base. Photo (Air Reduction Sales Co.).

News of the Industry

OMISSION OF CO-AUTHOR'S NAME—We regret that the name of J. G. WILLIS was inadvertently omitted as co-author of the article published on pages 31-32 of the July, 1939 issue, "Recommended Technique for Manual Welding of Vee Butt-Joints in Steel Plate." As published, the article carried the name of C. T. GAYLEY as author, whereas the article should have shown both J. G. Willis and C. T. Gayley as co-authors. Both of these men are employed at the Philadelphia Navy Yard, Philadelphia, Pa.

OUTSMARTING THE AUTOMOBILE THIEF—One of our readers, C. J. HOLSLAG of Newark, N. J., calls our attention to the fact that a veteran automobile thief (a four-time offender), who was recently given a life sentence in prison, made the statement that no car thief would take a car whose license plate was welded to the bracket and the bracket welded to the car. Mr. Holslag suggests that this presents a great opportunity for job welding shops because if a car has to be mutilated to change the license plates, no "respectable" thief would drive it.

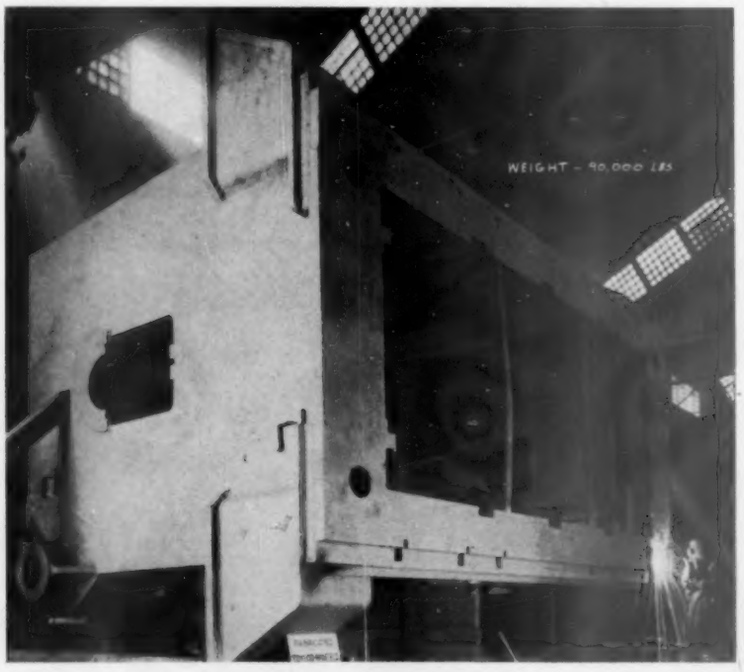
Taylor-Winfield—Welded Machine Frames

(Continued from page 57)

press. This frame weighed, as shown in the picture after complete machining, 36,000 lbs. Plate thicknesses used in this frame varied from 2 in. to 6 in. The throat was made in one piece from 4 in. plate. The upper part of the throat was formed with 12 in. inside radius. This provided added strength and improved the appearance materially. Note the upper front part of the frame which was formed, this also added to the finished appearance as well as strength. The lower platen was cut from 6 in. plate and keyways were machined from the solid plate. The size of this frame presents a marked contrast to that of Fig. 4.

Fig. 6. A large press bed fabricated from rolled plate and steel castings. This bed weighed 90,000 lbs. Steel castings were used for bearing caps, the intricate shaft housings, and driving journals. The total weight of the steel castings used was less than 4,000 lbs. This large bed was thoroughly stress-relieved and sand-blasted before shipping.

These photographs show clearly the wide diversity and flexibility of present day welded plate fabrication.



Heavy press bed fabricated by welding rolled plate and steel castings. Stress-relieved and sand-blasted.

Fundamental Course in Welding Metallurgy

The New York Section, American Welding Society, in cooperation with the Polytechnic Institute of Brooklyn will present a series of ten lectures during the fall and winter of 1939 and 1940 on the elements of metallurgy as it relates to welding.

The purpose of the course is to familiarize members of the welding industry with the composition and structures of the steel that they use to show how the steel is affected by the varied conditions of heat and stress in welding, to explain the mysteries of heat treatment and to point the way in which metallurgy can be used to control the welding processes.

The course will apply to all processes of welding. A small textbook will be prepared especially for the members of the course. The book will cover the subject of the lectures in detail so that members may study them before each lecture. A question and discussion period will be provided following each lecture. Some of the subjects to be covered:

(1) Changes in temperature of the base metal during and after welding and how they may be controlled.

(2) Thermal characteristics of different processes and effect of preheating.

(3) Distinction between different kinds of steel.

(4) Crystals, how they grow, and how they can be controlled.

(5) Critical points, grain size, how crystals deform, physical properties, effect of hot work, cold work, and effect of temperature.

(6) Equilibrium diagrams, segregation, blow holes, hot cracks, slags.

(7) Effect of carbon content, rate of cooling, heat treatments, grain refinement, alloying elements.

The course of lectures will start on Tuesday, November 21 at 6:45 p.m., and every

Pressure Control

(Continued from page 63)

creasing pressure beyond practical limits. This method is to materially decrease the mass and friction of the moving parts. This is accomplished in an electrode holder of recent design which acts independently of the head of the welding machine and which provides a movable element of very light weight.

Briefly its construction employs a tube threaded or tapered at the bottom to take a standard welding tip. Just above the tip there is brazed one end of a tubular flexible copper braid. From the upper end of the inner tube there project small water-cooling attachments. An outer tube makes an easy sliding fit over the inner tube. This tube is brazed to the top end of the flexible braid. At the top end of the outer tube is screwed a cage containing a spring and centralizing washer. There is a graduated scale to indicate pressure in pounds. The pressure may be adjusted by screwing the cage up or down on the outer tubing. In this unit, only the welding tip, the light inner tube, and the water-cooling attachments are movable. The weight of this piece is usually between one and two pounds, as contrasted to the 150 lbs. on the average spot welder It can readily be seen by reference to Fig. 1 that this electrode will move much faster than the electrode in the conventional spot welder.

An electrode of this type has produced successful welds in non-ferrous metal and alloys which have heretofore been welded only with great difficulty. In most cases a lower kva. rating was used and the time element did not have to be so accurately controlled. Copper-to-copper projection welds, copper-to-leaded brass welds, and cross wire welding of light wall copper and aluminum tubing are illustrative of the type of work which can be produced by an ordinary spot welder. A number of samples of work of this type are illustrated in Fig. 2.

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EYE PROTECTORS FOR EVERY INDUSTRY

Tuesday thereafter, except on regular meeting dates of the New York Section.

A charge of $5.00 will be made to non-members and $2.00 to members attending the course. This price will include a copy of the lectures. The number to be admitted to the course will be limited so that reservations should be made early by application to GEORGE V. SLOTTMAN, secretary of the New York Section, whose address is c/o Air Reduction Sales Co., 60 East 42nd St., New York City.

» «

CLEVELAND SECTION AMERICAN WELDING SOCIETY LECTURE COURSE

An educational lecture course is being sponsored by Cleveland Section during October and November, 1939. WALTER DAVIS, welding engineer of Cleveland Railway Co., will present the following six lectures in respect to the welding of the more important commercial metals:

October 16—"Welding Fundamentals and General Considerations."
October 23—"Welding Plain Carbon Steels and other Ferrous Metals."
October 30—"Welding Low-Alloy Steels."
November 6—"Welding High-Alloy Steels."
November 13—"Welding Non-Ferrous Metals."
November 20—"Welding Non-Ferrous Metals."

The lectures are to be delivered at Fenn College starting at 8:00 p.m. on the above dates.

42% MORE VISIBILITY
with AGILE *mirror lens*

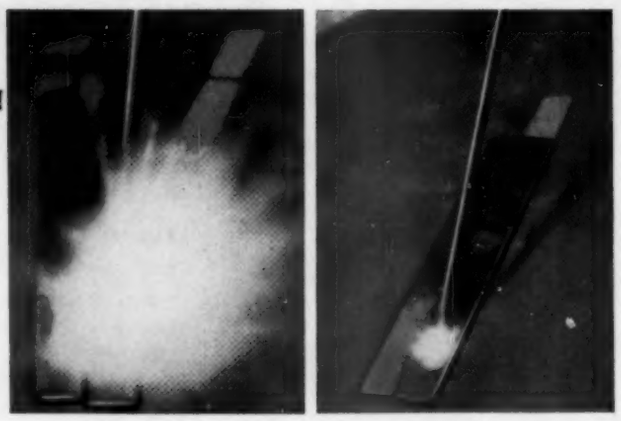

Photo at left shows welding arc as seen through a No. 12 CONVENTIONAL LENS. Note glare and lack of visibility.

Photo at right shows welding arc as seen through a No. 12 AGILE MIRROR LENS. Note visibility and lack of glare.

. . . Reduce Eye Fatigue

Eye fatigue acts slowly and indirectly, causing a serious drain on the energy of the welder. Headaches, dizziness and blurred vision slow up production. Protection of the eyes is not obtained through the color of a lens, but by the chemicals used in its manufacture. Agile Mirror Lenses have the correct ingredients.

. . . Speeds Up Production

The chemicals used in Agile Mirror Lenses not only give better protection to the eyes, but also produce yellow-green shades, which, like the green shades in nature, are most restful to the eyes. Those factors which tend to slow up production are eliminated by their careful production.

Agile Mirror Lenses for arc welding are as near perfection as a protective media for the eyes as science can produce. The mirror reflects back much of the glare, permitting the use of a lighter shade of dark glass—and a lighter shade of glass gives better visibility.

If you have never used an Agile Mirror Lens, you have missed an accessory worth many times its price. No more expensive than an average welding lens, but many times more effective.

Obtainable in the standard sizes—2 x 4¼"—and in the standard shades—No. 8, 10, 12, and 14. Special sizes can be furnished on request.

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Personals

COMPRESSED INDUSTRIAL GASES, INC., 221 No. La Salle St., Chicago, Ill., announce the following appointments in executive personnel: C. T. PRICE has been promoted from vice-president in charge of sales to the position of vice-president and general manager. In his new capacity Mr. Price will have full charge of all operations of the company. F. M. WYMAN has been appointed general sales manager and R. G. WILSON has been made assistant general sales manager. P. G. WESLEY assumes jurisdiction of the Medicinal Gas Sales Division. A. H. STEINBRECHER, while continuing as a vice-president will also assume the responsibilities of assistant general manager in charge of production. H. B. PEARSON, JR. has been elected secretary and treasurer. G. R. KALL has been appointed general accountant.

» «

R. CARSON DALZELL has been appointed technical advisor for Revere Copper and Brass Inc., Baltimore Division. Mr. Dalzell will have headquarters at 1301 Wicomico St., Baltimore, Md.

» «

CHARLES L. HUSTON, JR., assistant staff supervisor of employment at The American Rolling Mill Co., Middletown, Ohio, has resigned, to join Lukens Steel Co., Coatesville, Pa., as director of personnel. The appointment was effective September 1, and Mr. Huston will be in charge of personnel activities of Lukens and its divisions, By-Products Steel Corp and Lukenweld, Inc.

» «

JOHN G. MUNSON has been elected vice-president, raw materials, United States Steel Corp. of Delaware. He succeeds THOMAS MOSES, who retired on August 18, upon reaching the corporation's retirement age of 70, and who will continue in a consulting capacity. Mr. Munson has been president of Michigan Limestone & Chemical Co. since 1928, with which as operating manager he began in 1919 his connection with United States Steel subsidiaries. Thomas Moses, the retiring vice-president, has been connected with the coal mining industry during his entire business career.

» «

RAY P. TARBELL has joined UNA WELDING, INC., 1615 Collamer Ave., Cleveland, Ohio, as sales engineer, specializing in automatic welding applications. Mr. Tarbell has spent a lifetime in the welding industry. He formerly was connected with The Lincoln Electric Co. and The Babcock & Wilcox Co. as well as being associated with Robert E. Kinkead consulting welding engineer.

» «

AVERY C. ADAMS has been elected vice-president in charge of sales, and a member of the executive committee and board of directors of the United States Steel Corp. of Delaware, effective October 1. Mr. Adams succeeds C. V. MCKAIG, who becomes assistant to president, with duties as may be assigned. Mr. McKaig continues as a member of the executive committee and board of directors. Mr. Adams, the newly-

Avery C. Adams.

elected vice-president, has spent his entire business career in the steel industry, having had several years of experience in steel mills in the Youngstown district and specializing in metallurgy before entering sales work. He first joined United States Steel subsidiaries in 1936 as manager of sales, sheet division, Carnegie-Illinois Steel Corp., after having served as a sales executive with Trumbull Steel Co., Republic Steel Corp. and General Fireproofing Co. Since December 1, 1938, he has been vice president and assistant general manager of sales for Inland Steel Co. Mr. Adams is a graduate of Yale University and served in the United States Navy during the World War.

Construction

THE FLORIDA EAST COAST RAILWAY has recently purchased two seven-car streamlined trains from the Edward G. Budd Manufacturing Co., Philadelphia, Pa. The two trains, of "daylight" type consisting of chair car, diner and observation-tavern car, will be of light weight welded construction, built of stainless steel. These trains will go into service about December 1 between Jacksonville and Miami on a fast, 6 hr. schedule. They will be powered by diesel-electric locomotives.

Trade News

INDUSTRIAL WELDING AND TESTING LABORATORY, 1915 Franklin St., Houston, Texas, has recently established a complete radiological department. THOMAS D. KETCHBAW, manager, reports that this industrial x-ray service covers such applications as x-ray examination of welded equipment, castings, perforating gun parts, oil well drill bits, etc.

» «

UNION CARBIDE ACQUIRES BAKELITE CORP. —At a meeting held Tuesday, August 29, 1939, the board of directors of Union Carbide and Carbon Corp. approved an agreement for acquisition by "Carbide" of all assets of Bakelite Corp. "Carbide" is a

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Now, lower prices make Sil-Fos and Easy-Flo brazing even more economical.

If you have never tried these fast working, low temperature silver brazing alloys, don't delay any longer. Without obligation, we'll gladly demonstrate, in your plant, how to join ferrous or non-ferrous metals on one of your jobs—or we'll braze it in our laboratory and send it to you for inspection and test. Check the coupon for details about Sil-Fos and Easy-Flo and the new price list. Also, use it if you want a demonstration.

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A low melting point alloy powder for brazing copper, bronze, brass. Applied to the joint of heated metals it flows freely with deep penetration to give strong, sound, malleable joints. Suitable for torch or furnace brazing. Well worth investigating.

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producer of chemical raw materials and "Bakelite" a user of chemicals in its converting activities. The consummation of the agreement will bring valuable supplementary facilities to both organizations.

» «

ARKANSAS SUPPLY Co., located at North 10th & "A" Sts., Ft. Smith, Ark., has recently been established as a distributor of welding equipment. W. W. HASTINGS, formerly connected with Compressed Industrial Gases, Inc., is manager of the new company. A full line of Meco oxy-acetylene equipment will be handled.

» «

THE BURDETT OXYGEN Co., 3300 Lakeside Ave., Cleveland, Ohio, has been appointed sole distributor in the state of Ohio for the complete line of Hampton a-c. electric welders, manufactured by HAMPTON ELECTRIC TOOL Co., 700 Walnut St., Edgewood, Pittsburgh, Pa.

The Burdett Oxygen Co. will carry a complete line of Hampton equipment.

» «

MARTIN ELECTRIC Co., Detroit, Mich., producers of welding transformers, air-operated welding guns and special electrical welding equipment, has moved into its new plant located on the Outer Drive, Detroit. Space vacated at the former Piquette Ave. plant has been taken over by Progressive Welder Co. and is being used for expansion of manufacturing facilities for the latter company's hydraulic and air-operated welding equipment.

» «

PROGRESSIVE WELDER Co., Detroit, Mich., was host on August 18 to members of the Resistance Welding Manufacturers Association. The business meeting, attended by ranking executives in the welding and alloy fields, was largely devoted to a discussion of current business policies and welding standards and practices. A demonstration of the practibility of using resistance welding in boat-building was provided by Progressive's President, Fred Johnson, whose all-steel welded yacht took the group to Canada for dinner.

» «

MODERN ENGINEERING Co., 3401 Pine Blvd., St. Louis, Mo., has recently appointed the following three firms as distributors of Meco oxy-acetylene equipment: (1) Welders Supply Co., 1274 Bay St., Toronto, Ont. (2) National Welders Supply Co., Charlotte, N. C. (3) Welders Service & Supply Co., 421 Mt. Elliott St., Detroit, Mich.

THE MINE & SMELTER SUPPLY Co., with headquarters at 1422 Seventeenth St., Denver, Colo., has recently been appointed distributor for Murex welding electrodes manufactured by Metal & Thermit Corp. Mine & Smelter will serve the state of Colorado, most of the state of Wyoming, the southwestern portion of South Dakota, the northwestern portion of Nebraska, and the northern part of New Mexico.

Current Reviews

ARC WELDING OF MILD STEEL—Foote Mineral Co., 1609 Summer St., Philadelphia, Pa., in the August, 1939 issue of its publication "Foote-Prints" present two excellent articles on the arc welding of mild steel with heavy coated electrodes. Much research data is presented, which should prove of interest to metallurgists. Another article of metallurgical interest deals with Zircon, Ilmenite and Monazite mining in India. A copy of this issue of "Foote-Prints" will be sent to any reader who makes request direct to Foote Mineral Co.

Recent Patents

SPOT WELDER

2,163,930. EDWARD G. BIEDERMAN, Detroit, Mich., assigned to GENERAL MOTORS CORP., Detroit, Mich. Filed Aug. 6, 1937. Issued June 27, 1939. This describes an electric welding machine for making a line of spot welds, which machine has a carrier for supporting and moving the work including one electrode which travels continuously in one direction and a companion electrode which

Are Your Electrodes Really Dried?

Are they thoroughly dried? Inside as well as outside? Proof against exposure to water? Proof against blowholes in weld metal caused by entrapped moisture? Another thing entrapped moisture can do is to expand and blow chips of the coating away beyond the arc.

Are they properly dried? This means dried so that the coating adheres strongly and solidly to the core, leaving no voids to facilitate flaking off when the electrode gets rough treatment.

Several installations of Steiner ovens verify the ability of the Steiner engineering staff to design and build drying equipment to the most exacting requirements of the coated electrode industry. Users of Steiner ovens have no moisture troubles.

Although they are extremely flexible, all Steiner ovens are custom built. **An inquiry will bring you an engineering analysis of the drying problem and its solution.**

STEINER OVEN DIVISION
STEINER-IVES COMPANY, Bloomfield, New Jersey

is continuously reciprocating while in operation. The companion electrode is adapted to momentarily engage and grip the work and travel along with the work and the electrode and then, upon the reverse movement of the electrode, release the work. A mechanism returns the electrode to its initial position, before the electrode again moves into contact with the work in its repeat operation, whereby a line of spot welds can be made whose spacing is dependent upon the speed of travel of the work and the rate of reciprocating of the electrode. The upper electrode takes the form of a plunger which engages and presses the work against the lower electrode.

» «

Welding Machine

2,163,657. Ernest E. Beckman, Lind, Wash., assigned in part to Walter D. Krehbiel, Lind, Wash. Filed Aug. 7, 1937. Issued June 27, 1939. The inventor describes a machine for feeding a welding rod towards work being done. The device maintains end of the rod in correct spaced relation to the work to provide proper gap during a welding operation. The device also provides for causing the rod to follow a circular path or orbit as it is advanced towards the work and thus permit what is known as weaving or lacing to be automatically carried out without special attention by the operator. The machine has an improved arrangement of feeding rollers and pressure rollers which urge the rod towards the feed rollers and thus insure steady movement of the rod during welding.

» «

Welding Along Irregular Lines

2,163,863. Edward G. Biederman, Detroit, Mich., assigned to General Motors Corp., Detroit, Mich. Filed Sept. 15, 1937. Issued June 27, 1939. It has been the practice in welding two or more pieces along a curved line to use a hand welding tool, manual skill being relied upon to direct, shift, and move the tool along the path it was desired to weld. The machine of this patent welds along curved, irregular, and broken lines, or series of such lines, which lines are either continuous or discontinuous, and in either the same or different planes, so that the weld or series of welds will be accurately positioned on and along the prescribed and desired line of weld. The machine is also adapted to weld two or more pieces of metal along non-parallel or intersecting lines. The patented device moves the work unidirectionally and preferably continuously through a plurality of welding stations, each of which welds its prescribed area or lines and, by shifting the work during the welding operation, or between successive welding operations, separate but coplanar areas of work are presented to the welding stations. The apparatus has a carrier for the work, a plurality of welding stations which are provided with opposed electrodes arranged to contact and travel with the work during welding, and conveyor mechanisms for moving the work carrier and automatically to control the operation of the welders. The device appears to be particularly suited for spot welding.

» «

Welding Rod

2,165,022. William Clifford Anderson, Fort Peck, Mont. Government patent. Filed April 7, 1937. Issued July 4, 1939. To provide a weld free from gas pockets and slag a welding rod is made of the following composition: Principally ferrous material with not over 3.50 per cent by weight of carbon, 3 per cent of nickel, 3 per cent of molybdenum, 1.50 per cent of manganese, 4.50 per cent of chromium, .10 per cent of sulphur, .30 per cent of phosphorus. The rod is coated with a mixture consisting of mineral spirits 72.3 per cent by weight, 20.9 per cent of aluminum, 6.8 per cent of water glass. Such a rod forms a transparent envelope of non-poisonous gases surrounding the welding arc and adapted to exclude atmospheric oxygen, without interfering with the vision or endangering the health of the operator. The rod core is formed of a mechanical mixture of the ingredients; while the coating is supplied as a liquid into which the rods may be dipped.

» «

Welding Flux

2,164,775. Wilbur B. Miller, Niagara Falls, N. Y., assigned to Oxweld Acetylene Co. of West Virginia. Filed July 13, 1937. Issued July 4, 1939. A flux suitable

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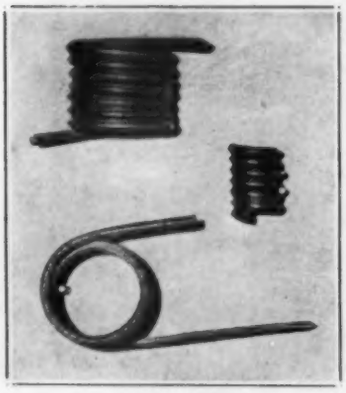

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with either positive or negative polarity in direct current welding, or with alternating current, is covered by this patent. The essential ingredients of the flux are an oxydic compound of titanium and an oxydic compound of zirconium. The titanium compound may be rutile, ilmenite, titanium dioxide, or titanates of the alkali or alkaline earth metals. The zirconium is in the form of zirconia, or zirconium ore. Preferably the titanium and zirconium compounds are present in proportions between 3 and 5 parts of titanium dioxide to each 2 parts of zirconia. The flux may also contain wood flour, slip clay, ferro-manganese, and a binder, such as sodium silicate.

» «

Blowpipe

2,164,972. Robert L. Wagner, Niagara Falls, N. Y., assigned to Oxweld Acetylene Corp., of West Virginia. Filed June 26, 1937. Issued July 4, 1939. A new blowpipe construction is shown. The blowpipe has a body, a valve block at the rear end of the body and a head block at the forward end of the body, a stem, and a mechanism associated with the valve block and extending ahead of the head block for gripping the stem and clamping the stem to the head block.

» «

Electrode Control Couples

2,166,638. Ludwig Muller, Finsterwalde, Germany, assigned to Kjellberg Elektroden & Maschinen G.m.b.H., Finsterwalde, Germany. Filed Oct. 27, 1937. Issued July 18, 1939. An automatic arc welding apparatus electrodes has a pair of electrode holders adapted to be alternately moved toward and away from the work to be welded. A motor is connected to a pair of coupling mechanisms, one of the coupling means being arranged between the motor and each electrode holder. Retracting devices are coupled with the holders and are controlled by automatic for continuous welding with a plurality of means for alternately engaging and disengaging the coupling means. The motor moves the electrode holders toward the work at a predetermined advancing speed when the respective coupling means is engaged, and the retracting means is disengaged. The couplings are of the electro-magnetic type, and obviate the need of two separate motors for the two electrode holders.

» «

Combination Welding Helmet and Safety Hat

2,167,969. Frederick M. Bowers, Chester, Pa. Filed Oct. 1, 1937. Issued Aug. 1, 1939. It is difficult for an operator to wear both a safety hat and a welding helmet, since the helmet is hard to fit over the hat. The patentee provides a combination headgear which may be dissociated so that either the welding helmet or the safety hat may be worn separately, as occasion demands. Due to the need for effectively guarding the head and face of the operator against flying particles of steel and oxide, a seal is provided between the helmet and the safety hat. Welding helmets commonly employ a headband that extends about the head, the band carrying a cross strip that extends across the top of the wearer's head. The inventor manufactures this headgear as a single unit, and then supplies means for attaching a welding helmet to the headgear in such a manner that it may be readily detached from the headgear.

» «

Titanium Hydride Flux

2,168,185. Peter P. Alexander, Marblehead, Mass., assigned to Metal Hydrides, Inc., Clifton, Mass. Filed Sept. 25, 1936. Issued Aug. 1, 1939. The patent describes the use of titanium hydride as a flux or flux ingredient in arc welding to prevent contamination of the iron with oxygen and nitrogen. When such a flux is supplied to the hot zone, the titanium hydride begins to evolve hydrogen. This atmosphere of hydrogen protects the particles of hydride from rapid combustion and allows the flux particles to come in contact with the weld metal, before the flux active properties are destroyed. However, after coming in contact with the molten metal the particles of titanium hydride are instantly dissociated, releasing nascent hydrogen and titanium. Their affinity for oxygen and nitrogen is so great that all the iron oxides and iron nitrides are reduced forming titanium oxide and titanium nitride and a certain amount of steam.

W-AL-CO RODS

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A.W.S. Technical Program

(Continued from page 43)

"Designing Welded Frames for Continuity," by BRUCE JOHNSTON and E. H. MOUNT, Lehigh University.
"Design and Fabrication of Welded Structures," by C. E. LOOS, Carnegie-Illinois Steel Corp., and F. H. DILL, American Bridge Co.
"Present Day Practice in Structural Welding," by A. L. WILSON, Mississippi Valley Structural Steel Co.

2:00 P.M.—Nothing but committee meetings are scheduled for Thursday afternoon.

7:30 P.M.—Annual Banquet—Boulevard Room

FRIDAY—OCTOBER 27th

9:30 A.M.—Simultaneous Technical Sessions—(A) South Ballroom

MISCELLANEOUS SESSION

Chairman: K. V. KING, Standard Oil Co.
Vice-Chairman: F. L. PLUMMER, Consulting Engineer.

"A Study of Heat Effects in Welding," by Dr. W. A. PEARL, Armour Institute of Technology.
"Welding in Manufacture of Valves for High Pressures and Temperatures," by W. F. CRAWFORD and L. H. CARR, The Edward Valve & Mfg. Co.
"Shrinkage of Steel to Correct Distortion from Welding and Forging," by SAMUEL T. SMETTERS, The Sanitary District of Chicago.

9:30 A.M.—Simultaneous Technical Sessions—(B) North Ballroom

RAILROAD SESSION

Chairman: P. G. LANG, JR., The Baltimore & Ohio R. R. Co.
Vice-Chairman, E. WANAMAKER, Chicago, Rock Island & Pacific Ry.

"Maintenance of Way Welding," by C. E. MORGAN, Chicago, Milwaukee, St. Paul & Pacific R. R.
"Automatic Welding in Design and Construction of Railroad Rolling Stock," by F. C. HASSE, Oxweld Railroad Service Co.
"Production Panel Welding of Freight and Passenger Cars," by J. W. SHEFFER, American Car and Foundry Co.

11:20 A.M.—Annual Business Meeting—North Ballroom

Chairman: HARRY C. BOARDMAN, President, American Welding Society.

Annual Report of the President.
Election and Installation of New Officers.
Presentation of Past-President's Pin.

2:00 P.M.—Inspection Trip—Electro-Motive Corp., La Grange, Ill.

Welded pipe joint using a backing lip which is forged integral with pipe. Photo (Taylor Forge & Pipe Works).

Fractured casting of the shear

WHEN this 3″ thick shear casting fractured, repair welding with cast iron rods seemed to be the answer. Further consideration and inspection, however, revealed that if this method were used, it would be necessary to preheat the entire casting in a furnace to avoid uneven strains in the metal.

To do this was impractical for, after being heated, the casting would have thrown off so much heat that no one could have gone near it to do the work.

Why not figure how you would have done this job? Then check your answer with the solution on page 89.

Check your answer with the solution on page 89

New Technical Literature

We have listed on this page brief reviews of new technical literature. Any booklets or bulletins you may desire will be sent to you free of charge. Merely check or mark serial number of paragraph on order blank at bottom of page. No obligation.

Wire Rope Catalog

(122) The Hazard Wire Rope Division of American Chain and Cable Co., Inc., has a new catalog on wire rope (No. 20). This catalog is virtually a pocket-sized handbook on wire rope containing information of a practical and technical nature, in addition to list prices and specifications.

Welding and Cutting Outfits

(123) A new 24-page catalog showing complete line of Imperial oxy-acetylene and oxy-acetylene welding, cutting, brazing and lead-burning equipment, soldering equipment, gas and air torches, and welding supplies has been issued by The Imperial Brass Manufacturing Co. Torches, complete outfits, regulators, regulator adapters, goggles, flux, solder, etc., are included.

Portable Machine-Cutting

(124) A newly revised edition of this Linde booklet outlines numerous applications of portable machine-cutting, illustrating economies made possible through use of these universal cutting tools. Of interest to all who work with metals and wish to speed production and cut fabrication costs. 16 pp. Illustrated. 8½ x 11. (F-4062.)

Industrial Safety Equipment

(125) American Optical Co. has a new industrial safety equipment catalog which describes in detail a complete line of eye, head, and lung protective equipment, and also its new line of safety clothing. Industrial protection from head to ankles is provided.

Multi-Arc Welding Service

(126) Harnischfeger Corp. has completed Bulletin W-26, "The 200-Ampere Multi-Arc Welding Service," which describes completely the design of the new welder recently introduced by them. Bulletin W-26 illustrates compactness of the WA-200 machine and depicts graphically how its requirement of less than 3½ sq. ft. of floor space may be used to advantage.

Electrode Selector Chart

(127) Hollup Corp. has published a new electrode selector chart as a useful guide to welding users.

How Hospitals Use Welding

(128) This Linde pamphlet describes and illustrates several applications of oxy-acetylene welding which a number of economy-minded hospitals have developed for use in repair and maintenance of existing equipment, and in fabrication of new equipment such as furniture, fixtures and accessories. Many valuable suggestions for saving time and money in hospitals are presented. 4 pp. Illustrated. 8½ x 11. (F-4294.)

Diesel-Driven 300-Amp. Welder

(129) Lincoln Electric Co. has a 4-page folder describing the 300-amp. diesel engine-driven Type S-6055 Shield-Arc welder. This unit has a belt-driven gasoline engine for starting purposes.

Precautions and Safe Practices

(130) Here is a concise presentation of the do's and don'ts of oxy-acetylene welding and cutting with instructions for handling and caring for equipment. All users of the oxy-acetylene process should have a copy of the revised and enlarged edition of this Linde booklet which has just been published. 56 pp. Illustrated. 6 x 9. (F-2035.)

I.O.C. Flame Cutter

(131) An 18-page booklet gives technical data on the I.O.C. Model 100 flame-cutting machine. Practical information is included on the construction of templates and also directions for obtaining high precision cuts.

Utility of Carbide Residue

(132) This recently revised edition (Linde publication), containing many ideas on how to utilize carbide residue, should be of great value to all users of acetylene generators. Whitewash formulas, construction uses, industrial uses, and agricultural uses are described in detail. 20 pp. Illustrated. 4¾ x 7. (F-2801.)

Automatic Arc Welding

(133) General Electric Co. has issued a 16-page booklet describing applications and advantages of G-E automatic arc welding equipment using Thyratron control. This equipment is available for use with bare or lightly coated electrodes. (GEA-3042A.)

Air Circuit Breakers

(134) An 8-page booklet describes applications and operating advantages of General Electric air circuit breakers as employed for protection of resistance welding machines. They are for operation on circuits up to 600 volts a-c. (GEA-2997A)

Pesco Copper Welding Rods

(135) Perry Equipment & Supply Co. has a booklet detailing the procedure for welding copper with Pesco welding rods and flux. It is claimed that use of a copper rod possesses definite advantages over other non-ferrous rods for brazing.

200-Amp. "Shield-Arc Junior"

(136) Lincoln Electric Co. has a 4-page bulletin describing the 200-amp. "Shield Arc Junior" welder for belted or direct drive. The purchaser can provide his own drive or build his own portable welder.

Ignitron Contactors

(137) General Electric Co. has issued an 8-page bulletin describing the operating advantages of Ignitron contactors for spot and projection welding. Features emphasized are: (1) No moving parts, (2) Silent operation, (3) High-speed operation. (GEA-3058A)

Bantam Rotary Air Grinder

(138) Independent Pneumatic Tool Co. has a colorful bulletin detailing specifications and operating data for the new Thor Bantam rotary air grinder, which is only 5½ in. long and weighs 18 oz.

Dieweld Welding Rod

(139) A 2-page bulletin describes Amsco Dieweld, a new rod intended for reconditioning forging dies, hot and cold trimmers, shear knives, punches, etc. Applicable to all ferrous base metals.

Low-Current Arc Welders

(140) General Electric Co. has issued a 4-page folder describing its new 150-amp. d-c. arc welder and also the new G-E a-c. arc welders of the transformer type, available in 100-amp. and 200-amp. sizes. (GEA-3081B)

THE WELDING ENGINEER — September, 1939

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